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Editorial

'THE CITADEL'

This novel, written recently by Dr. A. T. Cronin, will no doubt prove to be one of the most stirring and revealing pieces of work brought out in the past year. Standing out as a forceful and direct exposure of unethical medical practices and presented in interesting novel form, it deals with a subject of profound interest to medical students and one of which the student is often found surprisingly uninformed.

One should consider this novel in two lights to describe adequately what has been portrayed. Speaking first of "The Citadel" as a literary effort, we find it a skilfully written, true to life book. The author makes his characters live and no medical student can read his book without projecting himself into the person of Dr. Manson—meeting his difficulties and reacting to his varied situations as he did. His characters are ingeniously presented, indicating the wealth of knowledge of human nature held by the author. There is seldom an idle moment in the book as one's interest is held to the very end.

The subject matter in this book, however, is what renders it an interesting study to the medical student and doctor. The author has depicted unethical procedures in almost every type of medical administration. His character, Dr. Manson, moves into nearly every form of medical practice, and encounters in each instance the divers evils which exist there.

Pictured as an honest, idealistic young man, he starts out as an assistant in a colliery town, then as a physician in an organized industrial medical service and from there to a term in institutional work. Finally, he settles in a cheap west London practice which later flourishes into an expensive and lucrative business.

One sees the danger in the slow moving medical executive boards which are supposedly designed to safeguard the health of the community in a colliery town. In industrial medical work, the inadequacy of a lay board in complete control of the medical services rendered there, is emphasized. This may well be an example of the dangers to be expected if, in future organized state medicine in this country, too much power is placed in the hands of a lay political group.

Dr. Manson sees the inertia of an improperly run research institution and disgustedly turns to a cheap London practice where he is thwarted by men of position and hampered by lack of hospitalization facilities for his patients.

On emerging into a lucrative prac-

tice he finds that this is gained at the expense of his honor, by such unethical procedures as fee splitting and catering to his influential friends. He appreciates this false standard of success only too late and starts out afresh in what he now, in view of his varied experience considers ideal work—the 'clinic' or 'group' method of medical administration.

Profession 'irregulars' actually play only a minor role in medicine, though this novel would lead one to believe that their part is one of major significance. If the reader were to believe that the story of Doctor Manson's life is typical of the situation that every young medico meets when embarking on his professional career, then he will no doubt consider our profession a most ignoble one—populated by men unworthy of the trust given them. Very probably this impression will be conveyed to many readers who have no means of ascertaining the true nature of things — and the deleterious effect therefrom is obvious. Fortunately, for the greater part of the book at least, the principal character, Dr. Manson, does himself uphold all our lofty ideals and thus preserves our reputation to some extent.

The Citadel opens up many questions for debate—questions pertaining principally to medical ethics and tradition.

The full danger of fee splitting is brought out vividly by Dr. Cronin. How, selling the best interest of one's patients for financial gain runs so contrary to the ideals of our profession and so often ends disastrously. Yet coming down to our own situation—one hears the student sometimes express the belief that when in practice he feels he should receive some added financial return for diagnosing a case (right or wrong!) then handing it over to a specialist. Considering the meagre returns a practitioner normally receives after carefully watching over a patient who eventually requires operation, compared to the surgeon's fee for that one isolated procedure—there would appear to be some definite disproportion. Whether that disproportion is accounted for or not in "all" cases by superior ability and greater experience and training on the part of the specialist, is a question. Provided the 'belief' did 'hold water' the student may not appreciate the evil of "unnecessary operations" which may eventually creep in to such a monetary compromise between specialist and practitioner. Then, too, of course, with money as a goal the practitioners' choice of a specialist will not be based on ability.

What is the reason for this great difference in fees? Is it due to the rather inflated status that the specialist has enjoyed the last fifteen years? One knows that we are gradually passing out of an era of specialism—a period since the war in which specialists were the vogue, during which time they held an unwarranted prestige among the laity. Up with his prestige went his fees and it is only natural that the practioner looked with interested eye at this new way to make money, wondering just how he could share in the proceeds.

Perhaps that is the basic cause for the fee splitting which is undoubtedly prevalent in our profession. Perhaps, also, the present-day trend back to the general practitioner with lowered specialists' fees will be an answer to the question, "What to do about it?"

Another question has been raised—is this book liable to leave a dangerous and unwarranted impression in the minds of the lay reader as to the perils to which he is exposed, allowing himself to be treated by such an apparently unprincipled medical profession? Dr. Cronin undoubtedly does paint a dark picture in his systematic exposure of our professional 'irregulars,' and anyone prone to be suspicious of medical men will seize upon this as proof of our unworthiness. We hope that few such men exist.

Possibly many suspicions raised in the minds of patients are a result of the cloak of mystery with which a me-

dical doctor so often unconsciously attempts to clothe his every act. Why shouldn't a patient know why this or that treatment is being instituted—provided it will do him no harm to know —and yet how often does a doctor take time to explain this to his patient? If such were the accepted procedure, it would, no doubt, do away with many unwarranted lines of treatment and less fleecing of the "Hypochondriac."

Dr. Cronin ends up by holding up the group clinic as the ideal method of dispensing medical services to the public and there is much to be said in its favour. The advantages to the professional member of such a group are the constant association and interchange of ideas of one member with another, each with his own specialist's point of view with a resultant "middle course" procedure provided there is cooperation. Such a tempering of the individual specialist's natural bias must be very broadening to the man and exceedingly to his advantage.

The patient, of course, viewed from every angle, receives treatment at a cost much below that which would be incurred by visiting the individual men.

This book should be read by all medical students. It serves not only as a warning of the darker and less pleasant side of medicine but pictures a clear thinking scientific young man running into difficulties which we shall all no doubt encounter, in part at least, during some stage of our career.

HYGIENE AND PREVENTIVE MEDICINE

Is It Practised in Our University?

On page 18 of the University of Toronto calendar for the faculty of Medicine one reads the following items:

Men's Medical Examination and Physical Training fee $5.00.

Women's Medical Examination and Physical Training fee $4.00.

We shall dispense with the concrete question of fees with the observation that there is obviously some favoritism accorded the weaker sex in this department — for why we know not — it may be sheer gallantry.

It would be interesting to record, however, the average student's recollections and impressions of the physical examination to which he was exposed on entering the University. This would be particularly true in the case of a final year medical student who is supposed to have some knowledge of how this should be conducted and what value can be placed on a thorough "overhauling." One need not describe the usual procedure adopted in this University to determine the students physical status—but suffice it to say that in the case of a normal looking male who volunteers no knowledge of marked physical defect—should he exhibit no signs of hernia or mitral involvement of the heart he is passed A class. It is understood that of late there has been an attempt to conduct a routine urinalysis — and of course there has always been a somewhat more detailed examination granted those who are suspected of pulmonary or cardiac disease but broadly speaking the examination is incomplete and inadequate.

The point we wish to make is this—such a compulsory physical examination involving the number of students that it does could be made a procedure of great value to the individual student and the health of University population at large. Here is an excellent place for the application of those far sighted principles of Preventive Medicine and Hygiene to a group of people at an age for the most part just past adolescence and at a stage of their life when they are about to embark on a period of 4 to 7 years of a sedentary existence. Many of them are about to be exposed to a course of heavy work with improper adherence to a hygienic manner of living—their own fault for the most part, no doubt, but nevertheless inevitable.

When one hears of such organizations as the American Student Health

Association — The President's Committee of Fifty on College Hygiene and the conferences which have been held by these societies in the past seven years one wonders that perhaps these ideals have not been put into practice in institutions best suited for this. 'The Health of the College Student' has become a popular topic of comment and we should like to further this by applying it quite openly to our own situation at Toronto.

The long course medical students are compelled to take with the subsequent internship involving as it does coincident exposure to fatigue and disease warrants special attention to health measures. It is well known that the age period of student life is that in which one finds the highest incidence of Tuberculosis and on looking through our own records it becomes apparent that few classes in medicine reach graduation without having at least one of their number fall out with that disease. To combat tuberculosis would require follow up procedure and repeated examinations or some such scheme as Dr. Price, of the Department of Bacteriology, has installed at the Sick Children's Hospital whereby Tuberculin positives are examined more carefully and those reacting tuberculin negative are recalled at intervals for a repeat test.

Certain American Universities deal with this problem of college student health a bit more astutely. They require routine Wasserman Tests, Blood Examinations, Tuberculin Tests and Urinalysis along with a strict and thorough physical examination on entering.

One need not labour the student with the advantages of Periodic Health Examinations for if he is not aware of these he shall soon learn in his fifth year when he falls under the yolk of our Department of Hygiene and Preventive Medicine.

While on this topic one may mention that some instruction in Sex Hygiene would certainly have its place if not in conjunction with the examining group then as a separate course open to all students. This phase of the average student's education is so obviously lacking that it is surprising that authorities have not removed before now the bogus veil of mystery which has always shrouded this sphere of a person's rightful knowledge. It is encouraging to see, in American Universities again, some definite move in this direction.

SURGICAL EMERGENCIES IN GENERAL PRACTICE EXCLUSIVE OF TRAUMA*

By ROSCOE R. GRAHAM, M.B.

By an abdominal emergency we mean an intraperitoneal catastrophe which demands an immediate laparotomy for its relief in order to save the patient's life.

All the catastrophes which may occur within the peritoneal cavity originate from one of three basic causes —acute inflammation, intestinal obstruction, or haemorrhage.

Haemorrhage may occur either into the gastrointestinal tract or into the peritoneal cavity. Haemorrhage into the tract manifests itself by vomiting or passing blood. If the loss of blood is sufficient to create an emergency it becomes obvious that the blood passed or vomited will be bright red. The only real emergency which arises as a result of haemorrhage into the gastrointestinal tract is the replacement of the fluid loss either by the intravenous administration of saline or of blood. The most common origins of haematemesis are ruptured œsophageal varices, which may be the result of Banti's disease in young patients or cirrhosis of the liver in the older patients. It is very rarely that the first haematemesis from Banti's disease will occur in a person past thirty years of age. Gastric polypi may be the source, and are often difficult to demonstrate, because many arise from the posterior wall of the fundus of the stomach. Their presence may explain a prolonged intractable anaemia for which no specific cause has been found.

The haematemesis most frequently met with is that from gastric or duodenal ulcer. No emergency procedure is necessary or advisable in such cases, and, while patients will die from haemorrhage arising in a duodenal or gastric ulcer, they rarely die following the first, or even the second, haemorrhage. For this reason we have empirically adopted a rule not only to advise, but to urge, operative procedure following a second massive haemorrhage from a duodenal ulcer.

Rectal haemorrhage of sufficient volume to create an emergency will arise from one of three sources—multiple polyposis of the colon, simple ulcer of the colon, most usually situated either in the cæcum or ascending colon, and carcinoma of the cæcum. Replacement of the fluid lost by intravenous administration of saline or blood, sedatives, and bed rest will control the emergency. In the case of a patient acutely ill who is not only passing dark blood but also vomiting dark blood we are immediately put on guard, and suspect the diagnosis of mesenteric thrombosis. Such a diagnosis demands a laparotomy, but if the diagnosis be missed the gravity of the error is lessened by the almost inevitable fatality which accompanies any procedure for a mesenteric thrombosis.

Hæmorrhage into the peritoneal cavity, not due to trauma, will arise either from the ovary or the Fallopian tube. Ectopic pregnancy is the more common. It is well to remember that while in the classical case there is the history of a missed menstrual period, with slight vaginal bleeding two weeks later, accompanied by a crampy lower abdominal distress, or a sudden shock due to the volume of blood lost in the peritoneal cavity, an ectopic pregnancy may be present and rupture without any disturbance of menstruation. The absence of rigidity, the absence of vomiting, and the cramp pain, together with a normal temperature and a high leucocyte count, make us suspect hæmorrhage rather than an inflammatory

*Reprinted from The Canadian Medical Association Journal, 34, 36-40, 1936.

process as the basis of the illness. In addition to this we have found almost uniformly a very marked diffuse cutaneous hyperæsthesia of the abdominal wall in cases where there is free blood in the peritoneal cavity. Also blood which has leaked between the peritoneal folds of the broad ligament is accompanied by vaginal hyperæsthesia, and bimanual examination will reveal the presence of a palpable mass. To think of ruptured ectopic pregnancy as a possible cause of the patient's emergency will in most instances make the diagnosis obvious.

On the other hand, hæmorrhage from a ruptured Graafian follicle creates an emergency because of the impossibility of distinguishing it from acute appendicitis. On only one occasion in our experience was the hæmorrhage of sufficient volume to demand an immediate laparotomy. In the other cases which we have operated upon the indication for operation in every instance was our inability to exclude acute appendicitis. The outstanding facts which have been elicited in this cyndrome are: it usually occurs midway between menstrual periods, accompanied by a crampy pain, a high leucocyte count, normal temperature and no associated nausea or vomiting. If the left ovary be the source, the tenderness will be in the left iliac fossa, but the degree of tenderness seems incompatible with the patient's general symptoms. If the operation be undertaken with the possible diagnosis of acute appendicitis, and free blood be in the peritoneal cavity, one immediately suspects a ruptured follicle as being the source, and, on locating it, the ovary does not need to be sacrificed. The follicle may be shelled out, and a few mattress sutures will control the oozing.

The second catastrophe is due to obstruction of either the small or large bowel. The mortality from small bowel obstruction averages approximately 50 per cent in large hospitals. The mortality from small bowel obstruction due to strangulated hernia is 6 per cent. It becomes obvious, therefore, that the mortality is in direct ratio to the time interval which has elapsed between the onset of obstruction and operation. The difficulty of diagnosing small bowel intestinal obstruction, caused by internal strangulation from bands, results from the description of intestinal obstruction as enunciated in most surgical text books. The patient with a lethal small bowel obstruction in its early onset does not appear ill or shocked. The pulse and temperature are normal. There is rhythmical, colicky pain, accompanied by nausea. Both the pain and the colic will persist, in spite of the generous administration of sedatives. We have come to believe that a patient, and particularly a patient with the scar of a laparotomy wound, who suffers rhythmical colicky pain, accompanied by vomiting and unrelieved by sedatives, is suffering from a small bowel obstruction, and unless we can disprove this, rather than whether we can prove it, operation should be advised. One must remember that in small bowel obstruction there may be no abdominal distension. The obstruction may be located so high up in the small bowel that there is not sufficient length of gut to cause abdominal distension. One may further be led into the pitfall, in the later phase of obstruction, of diagnosing a peritonitis because of a high fever and a high leucocyte count. We have noted in such patients a pyrexia of 104° F. and a leucocyte count of 20,000, and no inflammatory lesion. This phenomenon we believe to be due to dehydration, the result of loss of tissue fluids into the lumen of the bowel and by vomiting. The value of the administration of intravenous normal and hypertonic saline, together with an indwelling duodenal tube, has become sufficiently widely recognized that this form of therapy might be instituted in a patient who is suspected but not proved to be suffering from intestinal obstruction. This treatment will entirely mask all our preconceived ideas of the symptomatology of small bowel obstruction. The patient's feeling of

well-being will return and the pain will disappear, but if the fluid loss through the duodenal tube is maintained in large amounts, then one can be perfectly certain that the obstruction is unrelieved. A further pitfall is the comfort which the physician often takes from the passage of gas following enemata. This in our experience is no contraindication to the diagnosis of small bowel obstruction. Sufficient gas may accumulate in the colon to be passed per rectum, and yet the patient suffer a lethal small bowel obstruction. If, in a case where we strongly suspect a small bowel obstruction, it is possible to elicit a splash or succussion sound in a distended coil of bowel we need no further evidence to warrant a laparotomy. There is one condition which may simulate small bowel obstruction so closely that unless it is ruled out we shall be led into an unnecessary laparotomy. This is lead colic. If the patient's occupation is such that lead colic may be a cause, we are not dependent solely on this fact, plus the presence of a blue line about the gum margins, to reach a diagnosis, because, if suspected, the intravenous administration of 5 c.c. of a 10 per cent solution of calcium chloride will immediately relieve the symptoms.

Large bowel obstruction, on the other hand, presents an entirely different clinical picture. Apart from intussusception, which occurs in childhood, there are very few instances of acute intestinal obstruction arising in the colon in patients under forty years of age. Vomiting is conspicuous by its absence. Abdominal distension is marked. Colicky pain is present in a much lesser degree than in small bowel obstruction. Absolute constipation, as evidenced by the futility of enemata, is present. In an analysis of our cases we found only four causes: volvulus of the signoid; volvulus of the cæcum; peri-colic bands, and carcinoma of the colon. Peri-colic bands are of very infrequent occurrence, and, from the standpoint of treatment, respond to the same procedure as we shall discuss for carcinoma of the colon. Of volvulus of the cæcum and the sigmoid we have only met with two of each, and in none of these four cases was the diagnosis difficult, because of the presence of a localized tumour due to the distended cæcum or sigmoid.

We are thus left with carcinoma of the colon as the major cause of acute intestinal obstruction in the large bowel. In the last series of our cases which we analyzed this was present in 76 per cent, and in all cases of intestinal obstruction, including that of the large or small bowel, it was responsible for 18 per cent. There is fortunately in most of the cases a history of increasing constipation, a gradually increasing necessity of more drastic cathartics for some months prior to the acute catastrophe. We have not found a single case of acute intestinal obstruction of the colon due to cancer which was not distal to the cæcum. If one has the facilities of a large hospital, a flat x-ray plate of the abdomen will show the ladder pattern so characteristic of dilated small bowel in the presence of small bowel obstruction and the dilated colon in the case of large bowel obstruction. The site of the obstruction may be confirmed by the administration of a barium enema, which will stop abruptly at the obstructed point. On the other hand, one may be confronted with a case of obstruction where such facilities are not available, and where the patient cannot face the rigours of transportation to a large hospital. What, then, should be our procedure? When we realize that in excellent hospitals the average mortality from intestinal obstruction is approximately 50 per cent, and yet a simple laparotomy carries less than 1 per cent mortality, it appeals to us that if we cannot exclude definitely an intestinal obstruction the patient is entitled to a laparotomy. It may be impossible before operation to determine with certainty whether we are dealing with a small or large bowel origin. We further know that such patients stand operation very badly because of dehy-

dration and its associated biochemical upset. Therefore the administration of large amounts of fluid prior to operation justifies the delay entailed. In late obstruction we have given as high as 5,000 c.c. of fluid before operation in a few hours. Because of the tremendous dehydration which such patients suffer they will tolerate such a large volume of fluid intravenously. Aiming at relieving the obstruction by the most simple and atraumatic procedure, we first open the abdomen by a split muscle incision. If the cæcum and terminal ileum are distended we know that the obstruction is distal to this point, and we simply bring an area of cæcum the size of a plum through the skin and suture it by four interrupted sutures to the skin margin. This may be painlessly opened by the cautery in twelve to twenty-four hours. It may be stated that this patient is suffering from cancer of the colon, and we have not dealt with it. Such is true, but the underlying principle of dealing solely with the condition which has created the emergency is fulfilled, and a disregard of this principle in any abdominal emergency increases the mortality in direct ratio to the degree to which it is disregarded. If, on the other hand, we find the cæcum and terminal ileum are not distended, then we know that the site of the obstruction is in the small bowel, and a para-medial laparotomy wound is essential to locate and effectively deal with the causative lesion. After relief of the obstruction in patients who are very ill, an ileostomy tube placed in the bowel by the Weitzel method proximal to the obstructed site has proved of real value in our hands. Its efficiency is in the inverse ratio to the duration of the obstruction. The subcutaneous administration of pituitrin 1 c.c. and eserine, gr. 1/50, every one to three hours, is of the greatest value in the convalescence.

The third catastrophe is the result of an acute intraperitoneal inflammation. While one may multiply the origins of an acute intraperitoneal inflammation, in general practice there are really only two that need seriously to be considered in an emergency, namely, a perforated ulcer and an acute appendicitis. The other sources of acute intraperitoneal inflammation, such as primary peritonitis, acute cholecystitis, acute pancreatitis, perforative sigmoid diverticulitis, twisted ovarian cysts, and degenerated fibroids do not carry in their wake the terrific tragedy which delay in carrying out a laparotomy entails on the patient with a perforated ulcer or an acute appendicitis. Our sheet-anchor in the diagnosis of an acute intraperitoneal inflammatory lesion lies in the presence of three findings: first, the association of pain and tenderness; secondly, one point of maximum tenderness; and, thirdly, both pain and tenderness, aggravated by the patient quickly rolling over in bed. While there are many extra-peritoneal lesions which produce clinical syndromes which might be confused with a true intra-peritoneal lesion, I know of no such extra-peritoneal lesion which will fulfill the three above requirements.

The common extra-peritoneal lesions which produce symptoms referable to the abdomen are those associated with the respiratory or genito-urinary systems. In all such cases we find an abrupt onset. The temperature is usually 102° or over within twenty-four hours of onset, and the leucocyte count is usually well over 15,000 when the patient is first seen. Such extra-peritoneal lesions often render difficult the exclusion of an acute appendicitis. We believe that acute appendicitis is very rarely ushered in with a chill, and that in adults, but not in children, the temperature is rarely 102° or over within twenty-four hours of the onset of the distress. These findings, together with the absence of the trinity enunciated above, serve to put one on guard.

A perforated gastric or duodenal ulcer should not present great difficulty in diagnosis. Less than 50 per cent of such patients will give a previous history of indigestion. The pitfall in the diagnosis is the so-called latent period,

in which, following an interval of ten minutes to one-half hour of severe distress, the patient is comfortable. If one has the opportunity of seeing the patient for the first time during this quiescent period, the temperature and pulse may be normal, but the trinity of symptoms of acute intra-peritoneal inflammation is present, together with the additional evidence of definite, true muscular rigidity. True muscular rigidity never changes during the respiratory cycle, while voluntary rigidity has a momentary relaxation at the end of inspiration. In no intra-peritoneal disaster has the principle of dealing solely with the lesion producing the disaster yielded happier results in our hands. We have only one responsibility to a patient who suffers a perforated duodenal ulcer, namely, to save his life; we have no responsibility whatever in regard to the cure of his ulcer. With the simplified procedure which we now carry out even the most inexperienced physician could do it equally well. There is no perforated ulcer which is difficult to close by our technique. We make a small incision. To locate the ulcer is not difficult; and we put in three interrupted sutures, one of which goes across the perforation and one above and one below. Then, taking a free fat graft from the great omentum, just tie the sutures sufficiently tight to hold this fat graft in place, and the operation is over. No further exploration is done, and, in our experience, drainage seems of little importance. Using this principle we have operated upon in our Surgical Division 36 consecutive patients who suffered perforated duodenal ulcer without a fatality. Sixteen of these patients subsequently had to be operated upon, and none died as a result of the secondary operation.

We discussed at last year's meeting the management of patients who suffer from acute cholecystitis. At that time we felt that, could the diagnosis be established, one always had time to restore fluids and secure rest, and that there never was in acute cholecystitis an indication for a precipitate operation. Our experience during the last year has confirmed this attitude, and our mortality of 5.8 per cent has not been increased.

If one could but diagnose acute hæmorrhagic pancreatitis operation could be avoided. We have been convinced that patients will recover from acute hæmorrhagic pancreatitis of great severity without operative interference, and it is doubtful if operation carried out on such patients, which will still have to be done because of the difficulty in excluding other causes for the acute lesion, ever accomplished much in adding to the safety of their convalescence.

We are thus left with a consideration of acute appendicitis. The fact that the mortality from acute appendicitis in the United States and Canada is steadily rising is conclusive evidence that we are failing in the treatment of this disease. The attitude of the patient, as well as of many physicians and surgeons—"It was just an appendix"—I believe is responsible for this mortality. The diagnosis of the atypical cases of acute appendicitis presents the greatest difficulty. On our Division last year we had fifteen errors in diagnosis, eight of which were concerned with the diagnosis of acute appendicitis. There are two pitfalls in the diagnosis of acute appendicitis. The first is the development of an acute inflammatory process on top of a mechanical obstruction in the appendix due to a fæcolith. This may come on some hours or days after the onset of pain in the right iliac fossa. The second, and much more real pitfall, however, accompanies an acutely inflamed appendix located in the pelvis. There may be no abdominal tenderness, very little abdominal pain, no abdominal rigidity; urinary frequency is present, and red and white blood cells are found in the urine. Unless one does a routine rectal examination on every patient with abdominal symptoms the diagnosis of an acutely inflamed appendix which is lying in the pelvis will be overlooked,

and the presence of pus and red blood cells and urinary frequency may lead to a diagnosis of a urinary condition. Such located appendices often have an associated diarrhœa, and failure to do a rectal examination may lead to the diagnosis of colitis or enteritis. The difficulty in the diagnosis of the atypical cases of appendicitis has led us now to regard a patient who suffers periumbilical pain, which later moves to the lower abdomen, as suffering from acute appendicitis until this diagnosis is disproved. It is surely much less disastrous to remove a normal appendix than to wait until perforation occurs, with its attendant mortality of 17 per cent. One may have no opportunity to see a patient who has suffered from acute appendicitis until a mass is palpable in the right lower quadrant. While such a patient may have suffered from acute appendicitis, the disease now has gone beyond the appendix and becomes a localized peritonitis, with, in most instances in our experience where a mass is palpable, the association of suppuration. Such patients are tired, starved and dehydrated. The actual cause of their illness lies in this biochemical upset. Therefore this should be corrected before any procedure is carried out on the local lesion. We thus believe that no patient who suffers an acute appendicitis and who develops a mass in the right iliac fossa is ever a candidate for an emergency operation. In the last five years we have had admitted to our Surgical Division 38 patients with masses in the right ilic fossa following acute appendicitis. None of these was operated upon as an emergency; 29 recovered without operation; 9 simply had the abscess drained. When a patient has an abdominal abscess why should we treat it differently from an abscess elsewhere? The drainage of the abscess will surmount the present emergency, and the appendix may be removed later. We have advised that such patients return in three months for removal of the appendix, and in the five-year period only four have failed to follow this advice. Our indications for draining an abscess are: increase in the size of the mass, and the persistence of the pain, with a continued acceleration of the pulse rate. We believe that the elevation of the temperature is not comparable to elevation of the pulse rate as an indication for active interference.

Conclusions

1. The fundamental principle in dealing with abdominal surgical emergencies is to carry out the simplest operative procedure which will deal solely with the lesion which creates the emergency.

2. In many patients the major lesion is the biochemical upset, which overshadows the basic lesion. The correction of this by the administration of intravenous fluids, such as saline, glucose or blood, before operation is undertaken, will often convert a desperate situation into one amenable to treatment.

3. The three basic lesions responsible for intra-peritoneal disaster are acute inflammatory processes, intestinal obstruction, and haemorrhage into the lumen of the gastro-intestinal tract or into the peritoneal cavity.

4. The mortality of small bowel obstruction is in direct ratio to the interval between the onset of obstruction and its relief.

5. In large bowel obstruction, a simple blind cæcostomy will relieve every case except those due to volvulus of the caecum or sigmoid.

SOME COMMENTS RESPECTING DIGITALIS THERAPY*

By H. E. RYKERT, M.D., M.R.C.P.

In the treatment of heart disease, digitalis is the most valuable of all therapeutic agents. Digitalis was discovered in 1775 by Withering who at that time described clearly the indications for its use. His discovery followed the observation that an herb remedy which was concocted by an old lady in Shropshire and which, among other things, contained foxglove, effected cures in certain cases of dropsy which had not responded to the treatment of regular practitioners. In his writings on the subject he stated that the name digitalis was given to the plant foxglove by Fuchsius in 1592. Although since Withering's time a great deal has been written on the subject of digitalis, particularly since the turn of the century, the student is frequently in doubt in regard to the indications for the use of this drug, the amount of the drug necessary for the achievement of optimum therapeutic results, and the type of preparation of the drug to be employed. It is with these problems that the present communication is concerned.

Mode of Action and Indication

The greatest virtue of digitalis lies in the ability of the drug to slow the auriculo-ventricular conduction time. The remarkably beneficial results achieved in cases of auricular fibrillation with marked congestive heart failure may be attributed to this action of the drug. In auricular fibrillation the normal sinus pacemaker has been deposed and has been replaced by a "circus movement" in the auricles. The rate of this circus movement is generally in excess of 400 per minute. Impulses bombard the auriculo-ventricular node in a rapid and completely irregular fashion. Even at the onset the ventricles are unable to respond to the circus movement and a partial degree of auriculo-ventricular dissociation exists. Therefore, although the circus movement may be at the rate of 500 per minute, seldom does one find the ventricular rate to be in excess of 180 per minute and commonly the initial ventricular rate is 140 to 150 per minute. In optimum dosage, digitalis increases the degree of partial auriculo-ventricular block already existent and the ventricular rate is slowed to normal. Digitalis does not restore normal sinus rhythm. If in auricular fibrillation this does occur while the patient is being given digitalis, it must be attributed to coincidence and not to digitalis. In auricular fibrillation with slowing of the apex rate, for example from 150 to 80 per minute, the heart is released from ineffectual and wasteful effort, as the ventricular rate is slowed the minute volume output of the heart is increased, and remarkable improvement in the patient generally follows. Full digitalization is invariably indicated in cases of rapid auricular fibrillation with congestive heart failure. It is generally indicated in cases of auricular fibrillation in the absence of passive congestion, the exception being paroxysmal auricular fibrillation when the attacks are of short duration. In instances of rapid auricular fibrillation resulting from thyreotoxicosis it may be ineffectual unless other heart disease, such as rheumatic heart disease, co-exists. Rarely one encounters a case of rheumatic heart disease or of coronary disease in which from the outset the patient was a "slow fibrillator," that is to say: the apex rate, without digitalis, was less than 100 per minute. Many such cases do not require digitalis.

Apart from the action of digitalis on auriculo-ventricular conductions, the drug has been credited with two

*Submitted on request of the Editor.

other important virtues. It is said that digitalis increases the tone of heart muscle and increases the extent of ventricular contraction. To these effects of the drug the results derived by digitalis therapy in cases of congestive heart failure with regular sinus rhythm are probably due. Full digitalization is always indicated in sino-auricular tachycardia with passive congestion. In such cases the clinical result is usually less dramatic than that obtained in cases with auricular fibrillation, but it is often extremely good. In auricular flutter digitalis should always be given and usually results in the restoration of normal sinus rhythm via auricular fibrillation. In this arrhythmia the effect of the drug in producing auricular fibrillation probably results from the development of an intra-auricular block. Digitalis is not indicated in peripheral vasomotor failure (shock). It is of questionable value in cases of pneumonia with rapid regular rhythm, and its use in such cases has been stated to be actually harmful. Digitalis is also of doubtful value in cases of passive congestion associated with a slow normal rhythm.

Toxic Effects

The earliest toxic effects of digitalis in the body are anorexia and nausea. Shortly vomiting occurs and other signs of intoxication, visual and cerebral disturbances and diarrhoea, may make their appearance. In the heart, the earliest sign of digitalis poisoning is the occurrence of ventricular extrasystoles (bigeminal pulse). If the drug is continued in unaltered dosage after the advent of bigeminal rhythm, ventricular tachycardia and ventricular fibrillation may be induced. The occurrence of anorexia, nausea, vomiting or a bigeminal pulse is the indication for the omission of digitalis for a few days when therapy may be recommenced in lessened dosage. In relation to vomiting as a sign of intoxication, it must be remembered that frequently passive congestion of the gastric mucosa and not digitalis is the cause, and that when due to passive congestion full digitalization by the intravenous route is indicated.

Preparation and Dosage

Digitalis is most commonly given by mouth in the form of the dried leaf or the tincture prepared from the dry leaf. In recent years the tincture has largely lost favour since in this form deterioration of the drug is fairly rapid and, therefore, the potency is variable. Furthermore, when the tincture is prescribed in drops the patient is apt to miscount the number of drops or to use other than graduated minim dropper. For these reasons digitalis is best given in the form of a tablet or capsule containing the dried leaf. Only the preparations of reliable drug houses should be used. One and one-half grains of the dried leaf is equivalent to fifteen minims or forty-five drops of the B.P. tincture. The average patient requires eighteen to thirty grains of the dried leaf or three to five drams of the B.P. tincture for complete digitalization. In the more serious cases of congestive heart failure, when vomiting is absent, four to six grains given every six hours will accomplish digitalization in twenty-four to forty-eight hours. In large dosage such as this, digitalis commonly induces vomiting reflexly. It is usually preferable to give three grains thrice daily for two to four days, the apex rate being closely followed throughout this period. For maintenance of digitalization a daily dose of one and one-half grains is usually necessary. Some patients may require more and others may require less. Thus the maintenance dose must be varied to suit the individual need of the patient. One not uncommonly encounters patients who require two grains daily and others in whom full digitalization is maintained on one grain daily. Exceptional were the cases wherein a smaller maintenance dose accomplished the desired result.

In seriously ill patients with mas-

sive congestive failure or in patients with congestive failure in whom vomiting precludes the oral route for the administration of digitalis, the drug must be given intravenously. Three intravenous preparations are commonly used: Digifolin (Ciba), Digoxin (B.W. & Co.) and Strophanthin (B.W. & Co.). The first of these, Digifolin, is so prepared that one cubic centimeter is equivalent to one and one-half grains of the dried leaf. In cases of rapid auricular fibrillation, an initial dose of four to six cubic centimeters of Digifolin may be given intravenously. The effect is rapid and the maximum response is obtained usually within two hours. In the dosage of four cubic centimeters the drug may be repeated in four hours if the apex rate remains rapid or is rising at a high level. It may again be repeated in a dosage of two cubic centimeters at four-hourly intervals until the apex rate has reached a satisfactory level. In cases of rapid auricular fibrillation or flutter, wherein digitalis has not previously been exhibited and in which the indication for intravenous digitalization is present (massive failure in an extremely ill patient or massive failure with vomiting), Strophanthin (ouabain) may be employed. The initial dose of Strophanthin to be given intravenously is 0.01 grains. Five to twenty minutes after this dose, slowing of the ventricular rate commences and usually the maximum effect is obtained within one hour. As with all other intravenous medication, Strophanthin should be injected *slowly*. If the desired response is not obtained following the initial dose, a second dose of 0.02 grains may be given in two hours and this dose may be repeated after another two-hour interval. In connection with Strophanthin it should be added that this drug seldom causes nausea and vomiting. Digoxin is a third preparation suitable for intravenous administration. It is stated by the manufacturers to be a pure glucoside prepared from the leaves of digitalis lanata. It has the minor drawback of having to be diluted with eight to ten volumes of normal saline. This drug, like Digifolin and Strophanthin, is supplied in ampoules ready for intravenous use. The initial dose of Digoxin is 0.75 to 1.0 milligrams. The drug is absorbed and eliminated rapidly and the maximum response in the slowing of the heart is obtained in one to two hours.

SUMMARY

Digitalis therapy is indicated in cases of congestive heart failure with auricular fibrillation and auricular flutter, in congestive heart failure with a rapid regular sinus rhythm and in rapid auricular fibrillation or flutter without congestive failure. It is of questionable value in cases of passive congestion with a slow normal rhythm. In instances of auricular fibrillation complicating thyreotoxicosis unaccompanied by other myocardial disease or in cases of sinus tachycardia resulting from acute febrile diseases, digitalis is of little or no value. Similarly it is not indicated in the treatment of shock unless rapid auricular fibrillation or auricular flutter were present.

The majority of patients may be digitalized by the oral route. The dried leaf is a preferable preparation to the tincture. For full digitalization eighteen to thirty grains per os are required. Massive dosage generally is undesirable. Best results are achieved by giving three grains three times a day for two to four days. The average maintenance dose of digitalis is one and one-half grains. This dose must be altered to suit the need of the patient. Intravenous digitalization is indicated only in cases of massive congestive failure and auricular fibrillation or flutter when rapid slowing appears desirable, or when vomiting precludes the oral administration of the drug. For this purpose Digifolin, Digoxin and Strophanthin may be used, the latter only when digitalis has not been given previously.

MEASUREMENT OF NUTRITIONAL STATUS

By E. W. McHENRY, M.A., Ph.D.
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In recent years interest in nutrition has been greatly intensified largely because of the economic depression. The necessity for state support of a large section of the population has encouraged consideration of the composition and costs of an adequate diet. The nutritional activities of the Health Organization of the League of Nations and a number of reports, of which one by Sir John Orr may be listed as an example, have increased the interest, especially among persons who previously were only slightly concerned. Newspapers, magazines and public speakers have discussed most of the aspects of nutrition. Unfortunately, many loose statements have been made. We have seen statements ranging from one describing people on relief as grossly underfed to one saying that these persons were better off than ever before. In Canada there is an almost complete absence of data regarding the extent of malnutrition, if it exists, and certainly we know nothing accurately about the kinds of malnutrition which may be found here. A number of advantages would accrue from the securing of such information. Having found the defects of our dietary habits it would be possible to initiate intelligently a process of education. Loose statements would be made less frequently if precise data were available. From the view-point of public health it would be desirable to learn something about our present state of nutrition and how it could be improved. Such enquiries should be included in any public health program.

A number of different methods are available for the attempted measurement of nutritional status. These may be divided into three main groups: (1) physical examination of individuals, (2) procedures which have been especially evolved to determine vitamin deficiencies, (3) examinatiion of food intakes. Each of these classes will be considered in some detail. It should be pointed out that a measurement of nutritional status is intended to be an indication of the adequacy of the diet consumed by the person concerned; it should not be interpreted as a measure of physical fitness.

Physical Examination of Individuals.

Examination of individuals by physicians to determine if the person is malnourished is useful but there may be several possible disadvantages. A great deal of time and a number of examiners would be necessary to inspect adequately a large group. If the results were to have any value a set of criteria would have to be agreed upon and the interpretation would vary from one physician to another. Experience has shown great differences in a group separately examined by different men. The results would be more dependable if a group could be examined by a panel of physicians. Attempts have been made to reduce the variation between examining physicians by introducing various scales of classification, as for example, the Dunfermline scale which sets up four classes into which subjects may be placed. Even with such a scale the classification will depend upon the opinions of the examiners.

Various physical measurements have been proposed and used to introduce objective methods, less influenced by the personal factor. Too much emphasis has been placed upon weight as a criterion of nutritional status. Weight and weight-height tables which are used as standards are not representative of ideal weights and heights, since no one knows what they should be, but are averages of these measurements in

groups which have been studied. It is readily possible for undernourished persons to be overweight; the women of poor classes in Glasgow among whom Davidson found a great percentage of iron-deficiency anemia were overweight because of the excessive consumption of cereals. Measurements of weight and height are simple to make, take little time and are widely carried out in the schools, frequently by nurses or teachers. The results have been extensively used to make sweeping generalizations regarding the presence and extent of malnutrition. In the case of children general acceptance has been given to a correlation of weight, height and age. This simple correlation fails to take body types into account; a boy of slight frame may be adequately nourished but underweight by the standards commonly used. Racial differences are not considered in such simple measurements. It is a common observation that children now are heavier and taller at a given age than in previous generations, because of improved environment, including nutrition, but standards of weight and height have not been revised to suit present conditions.

Pirquet's index was an example of attempts to judge nutritional status by simple measurements and also to take into account body-type. Sitting height was measured in place of standing height, since a boy of ten who had had rickets would be shorter than a normal boy of the same age. The index was calculated as $\sqrt[3]{\frac{10 \times \text{weight}}{\text{sitting height.}}}$ If the found value was below 100 the subject was considered undernourished. Correlation of this index with careful clinical assessment has shown it to be no more accurate than the simple ratio, weight-height-age.

Several years ago the American Child Health Association, as a result of a careful study of 10,000 children, evolved a new index of nutritional status for children. The starting point of this A.C.H. index was medical judgment together with a very complete set of measurements. Thorough analysis of this material showed that several measurements were without value. It was found that the relation of the amount of soft tissue to skeletal build gives a reliable measurement of nutritional status, and this relation can be found by the taking of seven measures. With these measures it is possible to find the children who are lowest in three important respects, namely, arm girth for skeletal build, subcutaneous tissue for skeletal build and weight for skeletal build. Reference is made to standards developed from the examination of a large, representative group. The index has been simplified into a determination of arm girth, chest depth and hip width. Interested readers are referred to the excellent publications of the American Child Health Association for details. The use of this index is not as simple but it is much more useful than the common height, weight, age measurements. It is sufficiently simple to be used by school nurses and teachers. So far as the writer is aware it has not yet been tried in Canada but has been successfully employed by several investigators in other countries, among whom may be mentioned Leipold in South Africa and Aykroyd in India. It is the most attractive of the various available simple procednres to study nutritional status in children bnt critical trials on an extended scale will be necessary before general acceptance can be accorded to it.

By Determination of Vitamin Deficiencies.

Severe and long-continued deficiencies of any of the vitamins known to be needed in human dietaries produce characteristic diseases which are, in themselves, proof of the previous existence of the deficiency. Canadian dietaries are sufficiently good that very few cases of acute vitamin deficiency are seen, but there is a wide-spread opinion that many dietaries are sufficiently good to prevent deficiency dis-

eases but not optimal for health. Animal experiments show clearly that an acute deficiency condition may be prevented by the presence of small amounts of the specific vitamin in the diet but the condition of the animals is improved by the addition of more of the vitamin. Children showing none of the indications of acute vitamin B_1 deficiency exhibit an improved growth-rate and better health when vitamin B_1 is added to the diet. Various procedures have been suggested for the determination of vitamin nutritional status. Reference will be made to two of the vitamins only.

One of the manifestations of acute vitamin A deficiency is night-blindness, the inability to see in subdued light. This is due to a failure in the regeneration of visual purple after exposure to bright light. The pigment is regenerated properly if there is an adequate amount of the vitamin in the diet. Jeans and Zentmire working in the United States have claimed that there is a correlation between the amount of vitamin A in the diet and ability to see in subdued light the correlation holding between the two limits of adequate amounts of the vitamin and acute deficiency. Using special apparatus they have examined large groups of children and adults and found a surprisingly large amount of vitamin deficiency. The procedure has been favourably reported upon by Frandsen of Copenhagen by Orr and by Harris of Great Britain. Two distinctly unfavourable reports have recently been made by Snelling of Toronto and by the United States' Public Health Service. These latter reports state that the subjective factor causes such an error that the test is valuless. Because of these opposing reports a careful revaluation of this test is needed.

One of the characteristics of scurvy is generally conceded to be a weakening of capillary walls with resultant areas of haemorrhage. Increased capillary fragility is not specific for acute vitamin C deficiency since it is found in a variety of conditions, for example, scarlet fever. Despite this lack of specificity, Gothlin of Sweden and Dolldorf in the United States used measurements of capillary fragility as indicators of the state of vitamin C nutrition. Weld in Toronto, found that there was no such correlation and the intake of vitamin D had more effect on capillary fragility than had vitamin C. If Szent-Györgyi is correct about the existence and action of vitamin P, this vitamin is more concerned with capillary fragility than is vitamin C. There appears to be little justification for the use of capillary fragility tests as a measure of vitamin C nutrition.

Following the identification of vitamin C as ascorbic acid and the development of methods for the estimation of that substance by chemical titration, determinations of ascorbic acid in urine and in blood have been extensively employed. In simple titrations of urine, particularly of specimens weak in ascorbic acid, errors may be found sufficiently great to vitiate the results. Moreover the absolute amount of ascorbic acid in urine is not a measure of vitamin C nutrition. The so-called "saturation test" enables titrations of urine to give useful results. If a large dose of ascorbic acid is given to a person who previously was ingesting adequate amounts, the major portion of the given dose is promptly excreted. Ascorbic acid given to an individual previously subsisting on an inadequate diet is used to complete the saturation of the tissues and is not excreted. On this basis vitamin C nutrition may be judged by whether or not there is immediate excretion of a large dose of ascorbic acid. Measurement of the amount of ascorbic acid in blood may be found to be useful in assaying vitamin C nutrition but titration procedures at present available for blood are of doubtful value.

By Examination of Food Intakes.

In the third type of method for the assay of nutritional status, that involving records of food consumption,

there may be a range between consideration of gross consumption data for a country, for a community, or for a family to detailed records of food eaten by individuals. Gross records may be of interest and value but they can be misleading. As an example, the consumption of milk in Canada may be considered. Estimated milk consumption for the country as a whole is two-thirds of a pint per person per day. We could easily be comforted by that estimate and think that Canadians drink large quantities of milk. More detailed examination of existing data alters the picture. Surveys by the Dominion Department of Agriculture show that the amount of milk used varies directly as the financial income. In one community in Ontario poor families had an average consumption of one-half pint per person per day while well-to-do persons averaged one pint. Moreover, one-third of the children in the low income families did not receive milk to drink. This is markedly different from the picture given by the simple gross estimate. Sweeping conclusions of an optimistic or pessimistic nature depending on the source of the conclusion, are frequently drawn from gross estimates without great justification.

A number of dietary surveys have been conducted by ascertaining the amounts of the various foods purchased by families in a given period. The total amount of food is then arithmetically divided among the members of the family on a basis of man-values or even on a per caput basis. In a family of two adults and three young children, the total amount of food may be sufficient when divided according to actual individual needs to give all the members an adequate diet; if divided on a *per caput* basis and the nutritional requirements of an adult taken as a standard, the result would indicate undernutrition. Obviously, data obtained in this way should be interpreted with caution.

Of all the various available methods the only one which gives an accurate estimation of nutritional status is an examination of actual food consumption of individuals. Memory and estimates cannot be relied upon; the food must be weighed. If the results of surveys are to have wide significance the number of individuals inspected must give a representative and statistically proper sample. Such a survey is expensive and time-consuming; very few of this type have been undertaken yet this is the most desirable procedure.

Comparatively little is known about nutritional conditions in Canada. It would be of great value to ascertain whether there is any or much malnutrition, and, if it does exist, to find the common dietetic defects. Nutritional education cannot be provided intelligently until this information is available. Properly conducted dietary surveys will be a necessity. Investigation of the applicability of the A. C. H. Index for Canadian children could be carried out in several districts and could be done by existing school medical service. It is to be hoped that such investigations will be initiated in the immediate future.

It should be pointed out that this discussion has been treated from the view-point of an investigator interested in the biochemical and economic aspects of nutrition. No attempt has been made to approach the subject from the restricted viewpoint of a practising physician or of a medical officer.

ORAL DIAGNOSIS

By DOUGLAS TANNER, D.D.S., B.Sc. (Dent.)

Several years ago the first signs of medico-dental co-operation was evident. To-day, fraternal co-operation is a reality, with both professions realizing the necessity for close alliance in offering an efficient health service to the people. It is therefore necessary that the dentist should have a certain medical background and the physician should understand sufficient dental pathology to aid him in making a more efficient diagnosis.

The following paper is not supposed to be a comprehensive study of dental problems, but to give the physician sufficient information concerning dental conditions that he may intelligently understand the significance of oral disease.

Generally speaking, diseases of the oral cavity are divided into three classes: (1) diseases of the dental pulp (the vascular tissue within the teeth); (2) diseases of the periodontium (the investing tissues of the teeth); and (3) diseases of the oral mucosa. Diseases of the dental pulp and periodontium will be stressed, whereas only reference will be made to diseases of the oral mucosa, as with such conditions you are more familiar.

Pedodontia.

In the examination of the child patient, the physician has the opportunity to observe the presence of dental caries, malocclusion of the teeth and oral manifestations of general diseases. The prevention of dental caries and the promotion of oral health is equally important in the child as in the adult, because the future health and happiness of the individual is built on the foundation laid in childhood. It is therefore necessary for you to study the metabolic processes in the child and correct any dysfunction. Mineral and vitamin sufficiency in the pregnant mother and in the child after birth is a responsibility which the physician must assume.

In malocclusion of the teeth, abnormal relationship of the jaws is observed. The etiology of this condition may be hereditary, dietary, glandular disturbances or the result of such habits as thumb sucking and pillowing of the jaws during reading or sleeping. Such cases should be referred for correction because the facial appearance of the child may be seriously affected, often resulting in an inferiority complex or other mental idiosyncracy.

Diseases of the Dental Pulp

Dental caries is the most frequent cause of infection of the dental pulp. Dental caries is relatively a disease of modern civilization, wherein the tooth structure is destroyed, so far as we know, by acid forming bacteria invading some defect in the enamel or retained in some area of stasis. The tooth enamel is disintegrated by the action of lactic acid, a product of bacterial metabolism. The decay gradually proceeds deeper into the tooth, eventually exposing the pulp to infection. However, the pulp is infected long before it is exposed, due to infiltration through the tooth tissue.

Periodic dental examination, maintenance of a balanced diet and efficient oral hygiene are our best defense against dental caries, and associated diseases. By such a program is the pulpless or devitalized tooth eliminated. Pulpless teeth which are such a serious factor in oral focal infection are almost unknown in the younger generation due to regular dental examination and more efficient dentistry. Prevention must therefore be our keynote, not only in oral disease but in general disease as well.

The dental pulp may become involved

by caries (bacterial invasion), trauma, malocclusion, circulatory infection or periodontal disease. Involvement of the pulp is frequently signified by pain which should be considered in the diagnosis of neurologic complaints. *Hyperemia,* in which the blood vessels of the pulp are enlarged and engorged may be temporary in character. If so, some mild irritation may be the cause of hypersensitiveness to heat and cold, accompanied by pain of short duration.

Acute pulpitis is most frequently a sequel to caries of the acute type. There are periods of prolonged pain in which heat (hot foods, etc.) cause exacerbations and cold gives some relief. The tooth is sensitive to percussion. The pain is often reflex in character being referred to other teeth and branches of the trigeminal nerve. This condition proceeds to suppuration (alveolar abscess), the patient develops a fever, headache and malaise.

Pulpitis may become chronic with only occasional discomfort. Differential diagnosis from hyperemia is important, as the pulp is infected and may remain an obscure focus of infection.

Extraction of such teeth is contraindicated in the acute period. Drainage must first be established through the root canal or soft tissues until the acute inflammation subsides.

Periodontal Disease

Superficial oral examination will not always disclose periodontal disease. In the complex type of periodontitis usually no visual change in the tissues is evident. Nevertheless, infected periodontal pockets are present. These pockets may only be found by means of an intense examination using periodontal instruments and X-rays.

There are, however, diseases of the soft tissues with which the physician should be familiar. *Gingivitis* is a superficial inflammation of the gingiva caused by local irritants such as calculus, improper oral hygiene, and excessive smoking or by systemic conditions such as diabetes, rickets, sub-clinical scurvy, pregnancy and numerous diseases whose oral manifestation is a gingivitis.

In gingivitis there is a marked redness and edema of the marginal tissues about the teeth. The gums bleed readily on the slightest provocation.

Periodontitis simplex and complex (pyorrhoea) are far more important as factors in focal infection than we have been inclined to believe. Characterized by the formation under the gums of deep pockets which contain saliva, food debris and bacteria thus establish incubation zones for the production of oral infection. Numerous pockets are usually present in a mouth and thus the area of infected soft tissue for the absorption of toxins is extremely large. The haemorrhagic condition of the tissues stimulates such absorption. Absorption also occurs into the gastro-intestinal tract by swallowing toxic exudates from the periodontal pockets. Such absorption causes a lowered resistance of the body, and should be regarded as a potential source of metastatic infection.

The simplex type is evident upon examination and usually occurs as a result of poor oral hygiene. The gingival tissues are affected throughout the entire mouth, are inflamed, bleed readily and are often hypertrophied. A good deal of calculus and food debris is usually quite evident. It is frequently termed "filth pyorrhoea," which is self explanatory.

In the complex type the gingival lesions do not appear until late in the disease. The disease is localized to parts of the mouth where malocclusion exists. Bone destruction occurs early in the disease, so that absorptions of toxins may be of serious consequence before visual evidence of the disease is apparent.

Periodontal disease can be prevented and can be cured in the early stages. The role of the physician is important in the diagnosis of etiologic factors of a systemic nature. His part is an important one in the realization that periodontal disease is a very virulent source of infection.

Necrotic gingivitis (*Vincent's infection, trench mouth*) is an acute infection of the gingival tissues accompanied by marked general symptoms. Predisposing causes are gingivitis, or some local irritation. Many authorities agree that faulty diet resulting in a sub-clinical scurvy and lowered resistance of the gums to be the prime predisposing cause. On such affected tissue the fusiform bacillus and treponema vincenti, normal habitants of the mouth, find fertile ground to develop.

The disease is characterized by the formation of a gray, grayish-white or grayish yellow superficial ulcers upon the gum and extending into the interdental spaces. The ulcers are painful, present a well defined margin and are covered by a pseudo-membrane which upon gentle removal presents a bleeding surface. There is a very distinctive odour to the breath which alone is almost conclusive evidence of the disease. The infection has a sudden onset and the saliva is frequently metallic in taste. Microscopic examination shows a predominance of fusiform bacilli and treponema vincenti. This factor is not conclusive because such microscopic pictures may be obtained from many normal mouths.

There is usually a fever (99-102° F) present, malaise, loss of appetite, headache and constipation. Leucocytic count is generally below 10,000 with a slight lymphocytosis.

General anaesthesia and oral surgery are contra-indicated during the disease. The patients eating and drinking utensils should be segregated.

Focal Infection

The part played by oral infection as an etiologic factor in systemic disease is generally recognized. To-day there is sufficient proof wherein the removal of an oral focus has beneficially affected or cured some systemic condition.

It is therefore the duty of the dentist to be able to efficiently locate and treat oral infection. It is the duty of the physician to be aware of the possibility of an oral focus and to see that the patient has a thorough, common sense oral diagnosis. The indiscriminate extraction of teeth is to be regretted, lack of knowledge on the part of some physicians and some dentists to properly diagnose pathological conditions of the mouth is the only reason.

Failure to achieve successful treatment after the removal of foci does not exclude their presence as frequently they are extremely difficult to locate. If the general disease is definitely linked with some focus of infection then the search must continue, for at the root of the trouble lies the cure. Pitfalls in treatment are frequently the facts that dentists are inclined to be too conservative in the elimination of potential infection and the physician is often too prone to accept the diagnosis of a general roentgenologist, instead of a specialist trained in dental diagnosis and oral pathology.

Whether oral disease may or may not be a focus in connection with a general disease, it is certainly good practice to eliminate oral disease at any time.

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A WORD TO THE WISE

There are certain essential proceedings in the nursing care of patients in the home which are quite simple to the initiated, but which may prove baffling to the young practitioner who is faced, for the first time, with this particular responsibility. How, for instance, does one give a sick person a bath in bed? How does one turn him, and change his bed linen? How are bedsores prevented and treated? What does one do about distension, incontinence, vomiting, etc.?

One's instructions can be given with considerably increased confidence if one is more certain how to carry out the procedures oneself. In most households there is at least one person who is competent to execute these.

Let us first deal with the *bed-bath,* which includes *care of the mouth,* which is given first, and *care of the hair* which is given later. A neglected mouth is a menace to the entire system. The majority of patients can use mouth-wash and brush their teeth, those who cannot will need close attention. When the mouth is dry and the tongue coated and dirty, apply Liquid Paraffin with a swab stick, working well around the gums and crevices. Frequent applications of Glycerine, Liquid Paraffin, and lemon juice, (equal parts) will help keep fresh a dry mouth and lips. Sodium Perborate used as a mouth-wash, and the powder applied locally, will relieve the pain and heal small ulcers. For a really foul mouth where a parotitis is imminent use a wash of "Hygeol" (1 in 12). It has a most unpleasant taste but is very effective and destroys odour. If a patient's mouth needs constant attention, keep a tray in readiness with mouth-wash, swab sticks, oil and glycerine, and a paper bag for discards. This could be kept on a dinner plate covered with a paper table napkin. Matches will serve as swabsticks.

Very sick patients, particularly those running a high temperature, should have a full bed-bath daily. Those not seriously ill should have at least two a week. Before beginning the bath see that the room is warm, the patient protected from draughts, and everything necessary for the bath at hand. This will include, where possible, a large basin of hot water, two towels, two wash-cloths, soap, rubbing alcohol, talcum powder, and a blanket to put over the patient for cover and warmth. Do not at any time expose more of your patient than is necessary for your procedure. If you are right-handed stand at the patient's right side. Cover him with the bath blanket. Untuck all the upper bed clothes and remove them one by one, folding them over a chair back. Or untuck the sides and turn them all down together in two folds to the foot of the bed. Place one towel under whatever part of the patient you are washing, to protect the bed. Proceed in the following order and do not question why! the face, ears, neck, chest, arms and hands, abdomen, back, thighs, legs, feet and pubic area. Work quickly, wash firmly, and dry thoroughly as you go along. After drying the back rub with alcohol and powder giving special attention to all bony prominences. If there is time to let the patient dabble his hands and feet in the basin of water, it is very comforting.

Washing a patient's back involves *turning him,* if he is too disabled to do so himself. To accomplish this, you being on the patient's right side, slip your left arm under his back to the far shoulder, and place the other arm around the hips in the same way. Ease him over, drawing his far side towards you from below. If he is completely helpless and apt to fall back, slightly over-turn him onto a pillow which you will have placed ready and which will support his abdomen. If you are planning to change this patient's under sheet, this would be a good time to do it since he is difficult to turn. Loosen the ends and near side of the sheet and tuck all its length as

closely under the patient as possible. This will leave a longitudinal half of the mattress bare. Place the central fold of your fresh sheet down the centre of the bed. Tuck the under half in, all around. Fold the upper longitudinal half as neatly as possible under the patient. Roll him gently back over the hump of these two sheets on to his back again, or if necessary on to his other side. Then go to the left side of the bed and draw out from under him first the soiled sheet, and then the fresh one. Pull it taut and tuck it in snugly all around. There is a definite advantage in having a draw-sheet over the middle section of a very sick patient's bed, which may cover a rubber sheet if necessary. It is more simple to change, in the manner that has been described, and saves damage to the bed. A paper bag, safety-pinned within reach to the patient's mattress is useful for discarding all those small untidy things which eventually fall on the floor or get buried in his bed.

When the bed is made up again, a towel should be put over the pillow and the *patient's hair* attended to. Short hair does not cause much trouble, but long hair needs careful attention or it rapidly works itself into a mat that is painful and often impossible to disentangle. It is best to part it down the centre and braid it on either side of the patient's head. If it does get matted, moistening it with alcohol is a great help to your brush and comb. If there are pediculi in your patient's hair, soak it well in Oil of Sassafras and wrap it tightly in a towel for twelve hours. Then wash it in hot vinegar and soap to remove the nits.

There is great comfort in *pillows*. When a patient is lying on his back, a large pillow under his knees gives considerable ease. Small pillows lengthwise under the arms save strain and support the elbows. When a patient lies on his side, a pillow tucked in snugly at his back helps him to relax and gives more efficient rest. A pillow between the flexed knees of this patient often relieves uncomfortable pressure. A pillow tucked firmly against the abdomen of anyone who is nauseated, or has a painful abdomen, affords comfort. Remember that a patient who is in bed for a long time may develop a drop foot, particularly with an injury immobilizing his leg. A firm pillow or sandbag against his soles will help to prevent this, besides giving comforting support.

To lift a patient higher in bed, place one arm across his shoulders underneath, and one around his thighs, and have him press with his feet at the same moment that you swing him up. This can be done with much greater ease if two people help, doing this in unison from opposite sides.

Unless there is some contra-indication, all bed patients should be turned at least every two hours. This helps to avoid weariness on the part of the patient, pressure sores, and chest complications. For this latter reason, each time the patient turns he should be made to breathe deeply for a few minutes. If he has mucus in his throat he should be made to cough it up.

To avoid *pressure sores*, besides constant turning, patients should have their backs and bony prominences well rubbed with alcohol at frequent intervals. Signs of pressure will be indicated by redness, the first danger signal—soreness, and eventully broken skin. Relieve the pressure by pillows, air rings, and keeping the patient off that particular area. Remember that anyone lying constantly on his back may develop sores on his heels. Similarly, a patient lying on his abdomen will invariably have painful ears. Small rings, like doughnuts made of cotton wool and wrapped around the bandage, will give great relief and prevent pressure on these areas. If a patient cannot be turned over, a good view of his under side can be obtained by sliding a small mirror under him.

Patients having *incontinence of urine, feces, or a profuse vaginal discharge*, should have the surrounding areas well oiled with vaseline, cocoa butter or, better still, an emulsion made by shaking together equal parts of alcohol and melt-

ed cocoa butter. This mixture hardens in the container but can be softened by immersing it in hot water. It makes an effective moisture-proof covering for the skin. It is also an excellent salve for superficial skin abrasions and pressure sores. Another simple and valuable home remedy is a paste made of ordinary brown laundry soap melted down and applied to the sore. Zinc Oxide has also good soothing and healing qualities. A badly infected, deep, sloughing bed sore should be packed with gauze soaked in "Hygeol" (1 in 6), or some such antiseptic, and the dressing changed at least every four hours.

Patients who have to spend a long time in bed should be trained, early, to develop the habit of regular *elimination* through diet, where possible, and without the aid of enemata. One is too apt to fall back on the administration of an enema as the simplest way out of this difficulty. It is not a good way. It is habit-forming and encourages the bowel to discontinue making any effort on its own. Use as mild a laxative as possible. Liquid Paraffin and Milk of Magnesia are old standbys. Cascara, dr. 1, three times a day, is good for reluctant bowels, until they grow co-operative. Milk of Magnesia, oz. ½, Calscara, dr. 2 or dr. 3, can be most effective when real difficulty is encountered. Magnesium Sulphate administered in the morning is equally good. Do not use enemata until you are forced to, and try first six ounces of olive or linseed oil per rectum retained as long as possible.

Patients who have incontinence of feces should have a simple enema daily, to avoid the distress of a constantly soiled bed. A simple enema consists of two to three pints of soapy water at a temperature of 106 to 110 F. It is best administered with the patient lying on the left side with his knees flexed, the right more so than the left. The rectal tube is oiled, some solution is run through it to clear it of air, and also to warm it. It is inserted just within the anus. When a small amount of fluid has run in, the tube can be inserted up to six inches. There is no point in forcing it further, the tube will merely curl back on itself.

If a patient has had scyballous feces in his rectum it may cause either diarrhoea or constipation. You will have discovered this by your rectar examination. Liquid Paraffin administered copiously by mouth, and oil by rectum, will help to soften this, but you may have to remove it with the examining finger. If a patient is on a milk diet, Liquid Paraffin is not a kind laxative to use in that it produces an extraordinary unpleasant odour in the sick room upon elimination.

When a patient has diarrhoea, not due to some disease of the bowel, a drink of hot boiled milk is often helpful. A small enema of boiled starch, prepared as for starching clothes, is very effective, particularly if Laudanum (Tr. Opii) dr. 1 is stirred into it.

If a patient has *distension* it may be relieved by inserting a rectal tube; or, by six ounces of olive or linseed oil given rectally; or by what is called a 1, 2, 3 enema. This consists of Magnesium Sulphate oz. 1. Glycerin oz. 2. Water oz. 3. Turpentine dr. 2 may be added. This enema is effective alone, but more so when administered fifteen minutes after an intermuscular injection of Eserine and Pituitrin. All enemata of this nature should be warmed to at least body temperature.

A hot water bottle, and more so a linseed poultice applied to the abdomen are effective in dealing with distension. A linseed poultice is made by adding linseed to water which is kept on the boil. When the mixture drops clean off the spatula it is of the right consistency. It is spread evenly on old linen which is folded over so the linseed does not leak. The patient's abdomen should be oiled and a towel placed over it. The poultice should be applied as hot as the patient can stand it. Remember that red headed people have unusually tender skin and burn much more readily than the average person. Watch a mustard paste carefully if your patient has red hair.

Patients often find *difficulty in void-*

ing when confined to bed; this has no reference to patients who have mechanical or organic inability. *The catheter should be the last resort.* Force fluids; apply hot towels or hot water to the recalcitrant area; move the patient as near to the bathroom as possible and turn on all the taps—the power of suggestion has its own value! Give the patient a simple enema; give him Sweet Spirits of Nitre mn. 30. by mouth; go downstairs and leave him alone.

If a patient has incontinence of urine, keep the head of the bed slightly elevated so that the moisture will run down rather than up under his back. If he has a permanent catheter installed his bladder should be irrigated daily. Boracic (1 in 40) and Potassium Permanganate (1 in 5,000) are the solutions most frequently used.

High temperature can be reduced by a cold sponge bath or an alcohol sponge (1 part alcohol to 3 parts water), given as described in the bed-bath procedure, except that the patient is covered with a sheet, rather than a blanket, and has a hot water bottle at his feet, and an ice cap on his head. A bathing cap secured around the opening with a rubber band makes a very good ice cap. Another method of reducing temperature is to soak a sheet in alcohol and lay it over the patient. If there is an electric fan available direct it on the sheet. An ice water enema is also an effective measure. Two rectal tubes or catheters are required for this; one is inserted well into the rectum to administer the ice water, and the other just within the anus to drain it off. This enema should not be retained over-long Remember that this patient with a high temperature will need special care to his mouth and should force fluids.

If patients are *nauseated* and it is compatible with their diet, grapefruit juice, ice cold ginger ale, and clear back coffee are often helpful remedies. Ice chips are comforting to the mouth of this patient, or any dehydrated patient. Sodium Bromide gr. 100 in water, oz. 3 per rectum, and Nembutal gr. 1½ by mouth are effective drugs in controlling vomiting. If vomiting is persistent, a patient can derive great comfort and benefit from a duodenal tube inserted into the stomach, either through the mouth or nostril. It should be aspirated every two or four hours. Fluid can be given by this tube as well as by mouth, and the stomach can be irrigated and cleansed with warm water through it. If a patient can at all tolerate fluids, one of its most nourishing forms is glucose drink. This is made by mixing and boiling one pound of commercial glucose, the juice and cut up rind of one orange and one lemon, and one quart of water. Boil for fifteen minutes, then make up the volume to one quart and serve ice cold. The new 5% glucose in normal saline intravenous outfit commercialized by Abbott Laboratories, Chicago, has solved the isolated practitioner's problem of intravenous therapy. The sterile bottles, containing 1,000 c.c. of 5% glucose, are fitted with caps and screw tops which can be removed, and are adjustable to the remainder of the apparatus which the doctor can sterilize in his office. Intravenous therapy is used constantly in hospitals for patients who are toxic and dehydrated owing to inability to tolerate sufficient fluids by mouth. Until recently this has been a difficult form of treatment to administer in the home. It does not, now, constitute a problem either in technique or finance. The apparatus can be used repeatedly. The flasks of glucose can be stored in readiness. Unless it is contra-indicated, patients should have about one hundred ounces of fluids in the twenty-four hours. If they are putting out an adequate amount of urine their fluid balance is probably satisfactory.

If you have a healthy patient, who, for some reason is confined to bed, he will be much more content if he is kept occupied. Your intelligent patient, knowing he has a long siege ahead of him, will start right in to read and study all those things he has not had time for previously. Your less sensible patient should be urged to do the same, or to start on some new interest which he can

follow in bed. There are few things more depressing to face than the fact that one's time is being completely wasted. Even preparing the household vegetables, and doing the family darning help to fortify one's self-respect.

If possible, move your patient's bed near to the window so that he can see out. Give him a mirror so that he can know what is going on in the street. If an outing in the fresh air is impossible, bundle him up warmly and open the window wide.

If this patient cannot sleep at night, owing to inactivity, waken him ruthlessly if he falls asleep in the day-time, and do not let him sleep late in the morning. At 11 p.m. give him a hot drink of milk or cocoa; wash his face, hands, and back with hot water; give him a good alcohol rub and a gentle massage; brush the crumbs out of his bed; untuck and straighten the lower sheet, make it taut, pulling first on the centre, then the foot, then the head; shake and turn his pillows. Do not give him any sedative, that is for your sick patient. Turn the light out firmly and say "Good night." Nature adjusts itself to hardships!

REG. N.

DIFFERENTIAL DIAGNOSIS OF HYPERPARATHYROIDISM*

By R. A. GORDON, M.D.

Hyperparathyroidism must be differentiated not only from other malactic diseases of the bones, but also from other disease showing hypercalcaemia with or without skeletal changes. From the appearance of the skeletal system the disease may be mistaken for osteomalacia, renal rickets, osteitis deformans, osteoporosis, focal osteitis, solitary giant-cell tumors, multiple myeloma, xamthomatosis of the skeleton, metastatic carcinomatosis, lipoid dystrophies, osteomyelitis. From the presence of hypercalcaemia it may be confused with multiple myeloma, polycythaemia vera, leukaemia, and metastatic carcinoma in the bone.

Osteomalacia: The skeletal deformities, X-ray and even the histological appearance of the bones in osteomalacia and osteitis fibrosa may be so similar that they cannot be clearly distinguished. Osteomalacia, however, is a disease associated with a deficiency in lime salts and vitamin D, and the metabolic disturbance is manifested in relatively reduced concentrations of calcium and inorganic phosphorus in the serum, and the loss of calcium mainly by the bowel. The parathyroids may be normal is size and structure, or they may show a slight secondary hypertrophy. In osteitis fibrosa, on the other hand, the parathyroids are primarily enlarged and hyperactive, the calcium concentration of the serum is in nearly every case increased, the calcium lost from the body is lost for the most part through the kidneys, and vitamin D therapy has little or no effect in reducing the hypercalcaemia or preventing progressive decalcification of the skeleton. Histologically the bones in osteomalacia are distinguished from those of osteitis fibrosa by the wide osteoid borders on the trabeculae, the relative paucity of osteoclasts, and the presence of a congested lymphoid marrow.

Osteitis fibrosa in children may produce changes in the lower extremities which may suggest rickets.

Paget's Disease: This is frequently confused with osteitis fibrosa, due to the fact that there is elevation of the plasma phosphatase in both diseases, and to the fact that thickening of the skull may occur in osteitis fibrosa as well as in osteitis deformans. Some observers consider osteitis deformans to be a special form of hyperparathyroidism, and sug-

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.Sequel to "Relation of Parathyroids to Bone Disease" Vol. XV, No. 2 — by Same Author.

gest parathyroidectomy for its cure. The great majority of opinion, however, is that the two diseases are distinct entities. The mineral metabolism and the histological appearance of the bones in the two diseases are quite dissimilar. The serum calcium concentrations and the balance of calcium are normal in Paget's disease, and unlike the general distribution of the lesions in osteitis fibrosa and the tendency to the formation of giant cell tumors and cysts, the lesions in Paget's disease are localized, the periosteum is nearly always involved, the cortex of the long bones is laminated, and cysts and giant cell tumors are absent. Finally, parathyroid enlargement in Paget's disease is conspicuously lacking.

Renal Rickets: This disease may present all the cardinal clinical and laboratory findings of the osteoporotic type of osteitis fibrosa complicated by impairment of renal function. The only possible way of differentiating between the two diseases is to decipher the course of events which led to the development of the skeletal deformities with renal impairment.

In hyperparathyroidism the changes in the skeleton antedate the symptoms of renal impairment. The patient may present first all or some of the signs and symptoms of hyperparathyroidism, such as lassitude, hypotonia, skeletal deformities, but no renal symptoms except polyuria.

In renal rickets the renal impairment precedes the bone changes. There is usually a history of nephritis or of symptoms of renal disease, and of stunting of growth before any skeletal deformities become evident. The changes in the bones may be the result of the abstraction of calcium from the bones by the chronic acidosis, to retention of phosphorus and its excretion in the bowel as calcium phosphate, to the physico-chemical effect of the retention of electrolytes, and to the secondary enlargement of the parathyroids which results from retention of phosphates or secondary to the changes in the bones.

Failing differentiation on the basis of history these two diseases cannot be distinguished from one another.

Osteoporosis: The senile type of osteoporosis may offer the greatest difficulty in differentiation. In these cases, however, the serum calcium and phosphatase and the urinary calcium excretion are within normal limits, there is little or no pain from pressure on the bones, and cysts are absent.

Solitary Giant Cell Tumor: These are localized in one bone, usually in the epiphysis of a long bone, and in this way appear to differ from the tumors of osteitis fibrosa. Histologically the differentiation of the tumors is impossible, but they may be differentiated from von Recklinghausen's disease by the normal appearance of the remainder of the skeleton, by the lack of hypercalcaemia and hyperphosphataemia, and normal excretion of calcium in the urine. In patients presenting multiple giant cell tumors the presence of hyperparathyroidism should always be considered.

Solitary Cysts: in bone usually occur in the metaphysis of the long bones in children, and may be differentiated from osteitis fibrosa by the normal appearance of the remainder of the skeleton.

Focal Osteitis Fibrosa is far more common than the generalized disease. It progresses slowly, affects one or more bones, and is usually symptomless until spontaneous fracture occurs. It is commoner in adolescents and tends to become arrested. The concentrations of calcium, inorganic phosphorus and phosphatase in the serum are usually within normal limts. It is still debatable whether this disease is to be considered as of parathyroid origin. There are opinions and arguments on both sides of the question.

Multiple Myeloma may simulate osteitis fibrosa clinically, radiographically, and chemically. The only positive method of differentiating the two diseases is by study of biopsy material from the affected areas.

Schuller-Christian's Disease: Diffi-

culty arises only in cases which are typical of either disease. Differentiation is not difficult in the presence of hypercalcaemia and hypercalciuria, but when these are absent or only slightly abnormal. The best guide to proper diagnosis is examination of a biopsy from the area involved, when the proper stains the lipoid granules in the foam cells of the xanthoma will clear up the diagnosis.

Metastatic Neoplasms in the skeletal system may sometimes be mistaken for osteitis fibrosa. This confusion arises not only because of the similarity of the radiological picture, but also because of the occasional finding of enlargement of the parathyroid glands and of hypercalcaemia in these patients. The differentiation may best be made by careful search of the remainder of the body for a primary growth, and by biopsy from one of the affected areas in the bones. Malignancy is more common in patients past 40, and metastatic carcinomatosis rarely affects the bones below the knees or beyond the elbow.

Osteomyelitis: This will only be confused with osteitis fibrosa in cases where the lesions are widespread. The clinical course of the disease will differentiate it from hyperparathyroidism.

Fragilitas Ossium and Osteogenesis Imperfecta: These probably have nothing in common with hyperparathyroidism except the tendency of the bones to fracture. Cases have been reported of changes in the parathyroids in cases of osteogenesis imperfecta, but it is quite possible that these changes were secondary to the disturbance in ossification.

Infiltration of the bones in Leukaemia and Hodgkin's disease and the osteoporosis of Polycythaemia vera and erythroblastic and haemolytic anaemias should not lead to confusion with osteitis fibrosa if the whole of the clinical picture of the disease is considered.

Treatment:

The rational therapy for hyperparathyroidism is, of course, parathyroidectomy. Other forms of treatment such as diet, vitamin D, and radiation have been attempted without any very satisfactory results. Cutler and Owen suggest that irradiation of the parathyroids may be useful in those cases in which operative procedures are contraindicated, in cases where the tumor has not been located at operation, and in patients in whom part of an adenoma is left behind at operation.

In operating for the relief of hyperparathyroidism three things must constantly be kept in mind, namely: (1) The anatomical sites of the parathyroids vary greatly. From the embryological standpoint it is possible to encounter parathyroid tissue anywhere from the pharynx to the mediastinum. They have not been found, as far as is known, above the upper poles of the thyroid, but there is no reason to suppose that they may not be. (2) The removal of normal parathyroids may cause a slight, temporary, and even permanent reduction in the serum calcium concentration, but usually fails to influence the course of the disease. (3) Some parathyroid tissue must be left, otherwise severe tetany may follow operation. Tetany in these patients is difficult to control and often fatal because of the association of extensive renal damage.

It is obvious that there are many phases of this subject which have been neglected entirely. It might have been interesting to discuss the pathology of the parathyroid glands themselves in osteitis fibrosa and the several examples of secondary parathyroid hyperplasia which have been mentioned. The discussion of cases might have given a more vivid conception of the disease entity. Unfortunately the time at our disposal has been much too limited for further consideration of these things.

AUTHOR'S NOTE—I wish to express my thanks to Dr. R. I. Harris and to Dr. Arthur Ham for the advice and assistance they have given me in the study of this subject.

INDICATIONS FOR HOSPITALIZATION OF THE MENTALLY ILL

By F. E. COBURN, '39.

In discussing any medical problem it is necessary to generalize but it is also necessary to remember, especially in Psychiatry, that we are treating a patient and not a text book condition. Every case must be decided on its merits taking into account all the known factors.

Formerly the practitioner presented with a patient suffering from a mental illness had little recourse but to send him to a mental hospital. Happily this condition no longer prevails and he is forced to consider which is the best of the four possible dispositions of the case—

1. Leave the patient in his home with varying degree of education of his family and supervision.

2. Refer to out-patient clinic if one be near, the patient still living at home.

3. Recommend change of environment—a trip, living with relatives, or taking up work in another place.

4. Hospitalization. The patient may be sent to a mental hospital, the psychiatric ward of a general hospital, a private sanatarium, or even a nursing home providing the risk is not too great.

The judgment of the practitioner is first influenced by the risk the patient appears to run by being at large in the community. If the nature of the symptoms suggests that the patient is likely to commit suicide it is an obvious necessity to confine him under close supervision for his own safety. In this regard it must be remembered that a desire to commit suicide is not *per se* evidence of mental illness. The patient must be protected from himself if he shows asocial tendencies. Not only must society be protected but the patient must not be allowed to commit acts which might become psychic traumata and prevent or retard recovery. This is particularly true where moral and sex inhibitions are lost. Mentally ill patients of some types are apt to enter into foolish business adventures and squander hard earned savings. Hospitalization may be necessary to prevent this.

So far we have dealt with reasons why the patient must not remain in the community rather than with positive indications for the treatment of his disease. In this, the present trend is away from the closed mental hospital to the home as the place of choice. But in many cases the home is not satisfactory either because of the patient's personality and disease or because of the poor insight and intelligence of the family. A case comes to mind of a young and attractive girl whose mother continually interfered with her love affairs believing the men not good enough for her daughter. As a result of these well meant efforts the girl developed a manic-depressive psychosis from which she made a rapid recovery but return to the same family situation brought disastrous results.

If the patient is working and can continue to work it is wise to keep him out of hospital if at all feasible because of the loss of morale he may suffer from enforced idleness. Treatment at an out-patient clinic would be indicated. Patients often take considerable pride in the fact that they are able to keep on with their work and this may aid in recovery. On the other hand the unemployed patient, the retired patient, or the housewife may need the stimulation provided by occupational therapy in a mental hospital.

The mental hospital, while it solves the practitioner's problem by getting rid of the patient, is not always good for the latter. He is uprooted from his environment and normal activities and set down in a strange institution which

at first may seem to him unfriendly. If there is no question of risk to the patient it must be considered whether or not the patient's present, or any other environment that could be provided, would be more helpful to him than a mental hospital. Of course in cases where restraint, with continuous bath, tube feeding, fever therapy or intensive psychotherapy are needed, hospitalization is the obvious solution. There is often some question from the relatives as to whether "locking the patient up with a lot of crazy people" will not have a bad effect on him. This as a matter of fact is not a great problem. It may even be of positive value as it provides an environment in which it may be easy for the patient to excel.

The same problem arises when considering the necessity of hospitalization with reference to the welfare of the patient's family. It is more largely a prejudice of this country than a fact that the presence of a psychotic person in a family produces a situation inimical to the mental hygiene of the others. In Gheel, Belgium, the plan of treatment of patients is boarding them out with the normal families on whose mental health contact with the patients has had a salutary effect. While it may be necessary to respect this prejudice and send patients who are no risk to hospital, we should use our influence to overcome it. The problem of a defective child in a family of otherwise normal people is a different one. The extra attention and consideration he requires upsets the home, tends toward the neglect of the others and produces in them an unhealthy attitude of resentment to such favoritism. Also the public attitude toward the whole family is coloured by the presence in it of a defective, providing an abnormal environment for the normal children.

A neurotic patient can upset a whole family, making life unbearable for all of them and if the family is not economically able to look after him in any other way, hospitalization may be necessary. The economic burden of caring for a non-income-producing adult may, in the practitioner's opinion, be a large enough factor in the welfare of the family to warrant making the patient a public charge, where otherwise he might be just as effectively treated at home. This of course is a community problem.

The mentally ill produce other community problems also. Many of them are apt to commit asocial acts; they may destroy other peoples' property or damage their persons. Such cases are obviously in need of custodial care. Others become social nuisances in less marked degrees. A litiginous paranoid may clutter up our over-crowded courts with innumerable lawsuits to the dismay of the court officials and of the defendants. Then too, the patient, whether married or single may continue to procreate. He or she is often economically and intellectually unable to look after the dependents and they become a public charge. In the case of the defective, who generally marries in his own intellectual group, there is grave danger of defective offspring. These are factors favoring hospitalization. On the other hand, care of these people is a heavy economic burden on the tax-payer and the practitioner must recognize his duty in this direction by keeping his patients out of hospitals if possible.

The above are the general considerations; let us now turn to a discussion of disease entities.

Schizophrenia—Early diagnosis and hospitalization of schizophrenics is very important, as it is in this period that the efficacy of treatment is greatest. Insulin therapy is indicated, according to its proponents only in the first year of the disease. An attempt will be made in hospital to give the patient insight into his condition even if it cannot be cleared entirely.

Manic-depressive—In some cases the period of excitement may last only a few days in which case hospital treatment may not be necessary. It is therefore often wise to delay action waiting to see if there will be spontaneous recovery. This is indicated especially if the patient has a history of previous

short attacks. Close home supervision will of course be needed. If however, the attack does not abate soon, the patient must get the more active forms of therapy available only in hospital. In depressed phases, especially if repeated or prolonged, custodial care may be necessary to prevent suicide.

Psycho-neuroses—These patients are often greatly benefited by a short stay in hospital where they see their troubles treated as purely mental phenomena, where they may be given insight into the underlying mechanism, and where appropriate psycho-therapy is given. An out-patient clinic may in some cases serve this function more adequately with less dislocation of the patient's social and economic life.

Epilepsy—It is probably wise for every epileptic to have a period in a hospital—not necessarily a mental institution—for observation. Certain exciting factors can be eliminated, reducing the number of seizures, and the proper dosage of luminal can be ascertained. Epileptics may also be handled at out-patient clinics. In long standing untreated cases deterioration may have progressed so far that permanent institutional care is necessary.

Paranoia—These patients, although they may appear quiet, are apt to become violent and some therefore need the close supervision of hospital.

Paresis—Every person showing a paretic colloidal gold curve in their spinal fluid should probably have fever therapy, which is given mostly in mental hospitals in this country. When blood and spinal fluid are negative they may be discharged, provided there are no organic lesions producing symptoms which make them a risk to themselves or a menace to society.

Melancholia.—Patients suffering from melancholia are potentially suicidal. The risk is greater in cases that have had repeated or prolonged attacks. These factors and the depth of the depression must determine whether they are sent to hospital.

Habituates.—Alcohol or drug addicts are very difficult if not impossible to treat outside an institution. While it may seem a stern measure to send them to hospital when they are still able to carry on their business duties, it may prevent a more serious and prolonged breakdown of mental and physical health later. In addition to the risk to themselves these patients are a public menace, the alcoholic in his operation of a motor vehicle and the drug addict in his support of the criminal element from whom he purchases his supplies. Their families may suffer also from the financial drain of the habit.

Post Puerperal Psychoses.—These are said to be best treated in hospital early, when a better prognosis can be made.

Mental Deficiency.—The great majority of mental defectives are best treated at home. But if they are of very low grade or if they show asocial tendencies, hospitalization is indicated. The asocial behavior is usually an evidence of poor environment. It is hoped that the training given at Orillia will rectify this and produce a self-supporting and respectable citizen.

Senile Psychoses. — Whenever possible, hospitalization should be avoided. The possibility of alleviating the condition is practically nil and the patient is largely a nursing problem. It is the physician's duty to exhaust all other means of providing the necessary nursing care before he sends the patient to hospital.

Delirium and Toxic Psychoses.—These are usually better treated in a general hospital where there are facilities for more adequate treatment of the underlying physical condition. Mental hospital is the last resort when the patient is too difficult for a general hospital to handle.

Summary.

Hospitalization is indicated where there is :

(a) Risk to the patient.
(b) Danger to the community.

(c) Harm to the patient's family.
(d) Hope for the patient in hospital treatment.

Each case must be decided individually on its own merits but if one or more of the above indications is present to any marked degree the physician is duty bound to advise hospital.

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HISTORY OF ANAESTHESIA

By C. SHEARD, '39

Modern anaesthesia is largely produced through inhalation. Ancient anaesthesia, sometimes, was produced by inhalation, but usually by some form of "laying on of hands"—Mesmerism or hypnotism, pressure upon nerves or blood vessels, application of drugs and so on. We have good reason to believe that for many years previous to the Birth of Christ, methods of producing artificial semi-consciousness or unconsciousness had been practiced. The earliest record we have of such occurence is related in Homer's Odyssey, when Helen puts some drug into the wine "to dull all pain and anger and bring forgetfulness of every sorrow." The Bible and Talmud contain many references to cases where torpor, or dull sleep were produced by artificial means. The utterances of the oracle of Apollo at Delphi (which actually were the ravings of the priestess Pythea) were inspired by the inhalations of carbon dioxide gas generated in the cavern. The priestess was removed to the altar before the convulsive stage set in. Another example of the dulling of consciousness was the inhaling of the fumes of Indian hemp by the Chinese, Scythians and Egyptians, who called it "Hashish." Up till this time the use of nepenthes or narcotics was not used with any idea of alleviating pain during surgical operations, but at the beginning of the Christian Era, Dioscorides wrote of the practice of boiling the root of the Mandragora in wine and administering it to the patient before the operation. Pliny, a contemporary of Dioscorides, makes references to the power of the Mandrake as a sleep-producing drug. Certainly we know it was often given to the poor wretches condemned to crucifixion. Further mention of Mandragora is found in the writings of Galen.

More recently, in the 13th century that is, Hugo de Lucca prepared an oil which he boiled with a sponge. The sponge was applied to the nostrils, producing unconsciousness. A return to consciousness was effected by holding another sponge soaked in vinegar at the nostrils. De Lucca's assistant, however, writes that this anaesthetic was far from perfect, for patients had to be held down by strong men.

Two centuries later, in 1540, Valerius Cordus discovered sulphuric ether, but it was never used as an anaesthetic until the 19th century.

By 1589, Porta, a surgeon practising in Naples, had used with considerable success, an essence made from hyoscyamus, solanum, pepper and belladonna, which was enclosed in a lead vessel. When the lid was opened the patient would inhale the vapour and thereupon pass into a profound senseless sleep. All these latter anaesthetics, or rather narcotics, were administered through inhalation, foreshadowing our modern anaesthesia. However, other forms of anaesthesia were prevalent. Valverdi compressed the blood vessels and nerves of the parts to be operated upon, taking his ideas from the Assyrians of old. In 1661, Greatrakes introduced "magnetic sleep"

which he produced by stroking the patient's body. It was probably 60% "hokum." Greatrakes was followed a century later by Mesmer, the Swiss physician, whose theory of "animal magnetism" has as a modern offshoot, Mary Baker Eddy's Christian Science.

Surgical anaesthesia had its real beginnings in the early part of the 19th century. It was in 1800 that Humphrey Davy, experimenting with nitrous oxide, when suffering from the pain of cutting a wisdom tooth, inhaled the gas and found the pain was thereby greatly alleviated. He later had the gas administered to him when he was having a tooth extracted. Davy was so impressed with the pain-deadening properties of nitrous oxide that he wrote, "Since nitrous oxide seems capable of destroying physical pain, it may be used in surgical operations where there is no great effusion of blood." Nobody paid any attention, however, and it was not till fifty years later that his suggestion brought results. In 1805 and 1806, Warren of Boston advised patients suffering with phthisis and asthma to inhale the vapour from "sulphuric ether." Faraday recognized the value of sulphuric ether and suggested it be used in surgery in 1818. However, his findings were ignored.

The first successful experiments in surgical anaesthesia were carried out by Henry Hill Hickman, a young English surgeon, from 1820 to about 1828. Hickman experimented on the lower animals, using his own expired air, carbonic acid gas and nitrous oxide as his anaesthetics (separately, that is). He was anxious to demonstrate his anaesthetics on humans, but his proposals were greeted only with contempt and skepticism by English physicians. In 1828 he appealed to the King of France, who referred his case to the Royal Academy of Medicine. The French doctors were no friendlier than their English brothers, and so Hickman returned to England where he died an embittered young man at the age of 29.

The scene now shifts to America, to the United States. It was a habit about this time for scientific lecturers to demonstrate the intoxicating properties of ether; and many young men and young women, particularly medical students, held wild frolics under the influence of ether. In 1842 Crawford W. Long of Georgia, while engaging in one of these "ether frolics," sustained several bruises which gave him no sense of pain at the time. Frequent observations led him to using ether to prevent pain in surgery. His first case was a Mr. James Venable, from whose neck he removed a small tumor without the patient feeling any pain. Long used ether in his practice continually after that, making no secret of his discovery, but on the other hand not advertising it beyond his own circle of friends.

Nitrous oxide was the next anaesthetic to be "discovered." Horace Wells, a dentist in Hartford, Connecticut, attended a lecture on "Laughing Gas" by a chemist named Colton. He noticed that a young man under the influence of the gas bruised himself quite severely and yet seemed unconscious of any pain. Wells was interested, and the very next day had Colton administer gas to him while one of his teeth was extracted. He felt no pain, and thereupon resolved to use N_2O in his practice. This was in 1844. In 1845 he resolved to put his discovery before the medical profession. He gave a demonstration at the Harvard Medical College, but probably due to a lack of knowledge of the administration of the anaesthetic, the demonstration was a fiasco. Wells became an object of public scorning and undeserved discredit. He continued to use N_2O in his private practice, but in 1848 his reason gave way and he died by his own hand.

The year 1846 saw the next advance,—the recognition and dissemination of the fact that, by inhaling ether fumes, complete surgical anaesthesia could be produced. It was in this year that William Morton, a former pupil of Wells', asked Wells about the manu-

facture of N_2O. Wells referred him to Dr. Charles Jackson, a well known chemist, who suggested that instead of using N_2O Morton should use sulphuric ether, as it was far easier to obtain and had practically the same effect. Acting on this suggestion, and totally unaware of Long's success with ether, Morton used ether in two dental cases and was so delighted with his success that he gave a demonstration in the General Hospital of Massachusetts. The demonstration was a huge success and Morton was acclaimed as a great scientific discoverer, but for a short time only. Morton tried to patent his discovery under the name of "Letheon." At the same time, Jackson came forward claiming that he was the real discoverer of Letheon and as such should be granted the patent. While Morton and Jackson were fighting it out, Dr. Bigelow, who had witnessed Morton's memorable demonstration, had recognized Letheon by its characteristic smell as nothing more or less than sulphuric ether. He sent the news to London, whence it rapidly spread through the civilized world. In 1847 James Y. Simpson first used ether in midwifery, finding that pain could be wholly abolished without interfering with uterine contractions.

Back in the United States, the fight for recognition as discoverer of surgical anaesthesia was waxing hot. An investigation authorized by Congress, was under way, and Jackson, Morton and friends of Wells (now dead) were forever at each other's throats. The controversy was abruptly ended, however, when Jackson announced that he had received a letter, along with irrefutable proof, from a Dr. Crawford Long of Georgia, to the effect that he, Dr. Long, had discovered ether four years previous to Morton's demonstration. This came as a thunderbolt to all of the contestants, and none of them ever made any further attempt to collect the reward money from Congress. As far as is known, Long never made any attempt to collect the money either.

About 1847, Flourens in France drew attention to the anaesthetic properties of ethyl chloride, but ethyl chloride never came into general use until 1895.

Sir James Y. Simpson had been using ether in his obstetrical practice, but he was dissatisfied with it, and in an effort to find a less irritating and more convenient anaesthetic, he consulted Mr. Waldie, a Liverpool chemist, who suggested chloroform, one of the constituents of "chloric ether." Simpson soon satisfied himself that chloroform was capable of producing anaesthesia, and in six days he prepared and published a paper entitled "Notice of a New Anaesthetic Agent as a Substitute for Ether in Midwifery and Surgery." As a result of this paper and Simpson's tireless efforts, chloroform rapidly began to supplant ether. Chloroform was more pleasant to take, easier to handle, and speedier in action than ether.

Simpson met with one setback, however, and that was in the theological opposition to the use of anaesthetics in childbirth. The Church argued that to use chloroform in midwifery was "to avoid one part of the primeval curse on women." Simpson wrote pamphlet after pamphlet, but so strong was the power of the Church and so universal the belief in the "guilt" of all women that he could make no headway. Luckily he hit upon an absurd but effective argument which helped him win his case. "My opponents forget" he said, "the 21st verse of the second chapter of Genesis. It is the record of the first surgical operation ever performed, and that test proves that the Maker of the Universe, before He took the rib from Adam's side for the creation of Eve, caused a deep sleep to fall upon Adam." This slowed up the Church for a while, but did not entirely kill the Sectarian opposition; but a new champion entered the ring in the person of Thomas Chalmers. His remarks and arguments, coupled with the fact that the Queen had called in Simpson to confine her,

dispersed the enemy forever, and the greatest victory of science against suffering was gained. It is significant to note that without anaesthesia there was a mortality of one in eleven in obstetrical cases, whereas with anaesthesia the mortality was one in three hundred and twenty.

Chloroform was believed to be safe until January 28, 1848, when a young woman, one Hannah Greener, died under its influence. Shortly after this two more deaths occurred from chloroform, and it soon became apparent that chloroform was a very dangerous drug. Many years passed without any light being thrown on the causes of these deaths until Dr. John Snow, in 1858, published his paper "On Chloroform and other Anaesthetics." Snow came to the conclusion, through numerous experiments, that chloroform caused death by primary cardiac paralysis, due to the inhalation of too concentrated a vapour. He introduced the first chloroform inhaler, by means of which the percentage of chloroform and air could be controlled. Dr. Snow also investigated amylene, an anaesthetic which he was the first to administer. The work that Snow had so admirably commenced was considerably checked at his death.

J. J. Clover was the first to improve the principle of chloroform administration. In 1862 he published an account of his chloroform inhaler, by means of which the percentage of air and chloroform could be more accurately regulated than hitherto.

The agitation on the question of the physiological effects of anaesthetics caused an investigation to be made by the Royal Medical and Chirurgical Society of Great Britain. The outcome of this investigation was the recommendation that practitioners use the "A.C.E." mixture as a substitute for ether or chloroform. This A.C.E. mixture was composed of one part alcohol, 3 parts ether and 2 parts chloroform. Modern doctors know it to be a poor anaesthetic because ether being more volatile, evaporates, leaving almost pure chloroform behind, which, if used with a heavy hand, produces disastrous results.

An interesting development arose in 1867, when Junker described in the Medical Times and Gazette a very ingenious apparatus for the administration of chloroform. It was particularly valuable in operations on nose and throat.

Since Wells' abortive attempt to establish it as a recognized anaesthetic, N_2O had been relegated to the background. But in 1863 Colton, the same man from whom Wells had received his inspiration twenty years before, had formed an association of dentists in New York for the purpose of performing operations in dentistry under nitrous oxide. By 1867 Colton and his associates had recorded 20,000 administrations without a single accident. These results strongly attracted the dental profession, and by 1868 practically all dentists were using N_2O in their practice.

In the same year E. Andrews of Chicago reported very favourable results using a mixture of N_2O and O_2. But Andrews failed to get the notice he deserved. In 1878, however, Paul Bert again drew attention to this procedure and it was used for a while with only moderate success, the apparatus being too cumbersome and expensive.

In the United States ether had always held its position, but when Clover introduced the "close" system of administration, the position of ether was greatly strengthened. In 1876, Clover invented an ingenious apparatus by which N_2O and ether could be administered either separately or in succession, and in the following year Clover invented a "portable ether inhaler" which has since enjoyed a wide reputation. Clover agreed with Snow in that chloroform distinctly reduced blood pressure and heart action, and in the next few years there were many disputes as to the cause or causes of death from chloroform.

It may be said that Sir Frederick Hewitt is the man to whose initiative and originality is due the general establishment of N_2O and O_2 as an anaesthe-

tic. It is now in very common use, and most physicians and dentists acknowledge it to be the safest of all anaesthetics. Unfortunately the equipment for its administration is expensive, so that the average physician cannot afford it. Most of these doctors use ethyl chloride. Ethyl chloride, it seems, has a reputation for being a dangerous anaesthetic, but the opinion is that this is merely the result of astute propaganda on the part of specialists who have large tanks of N_2O and O_2 at home, which they would not like to see wasted.

It is a sad but interesting fact to note that all of these pioneers, with the exception of Long and a few others, ended their days either in a state of mental aberration or actual insanity.

NUCLEUS PULPOSUS

By ODON VON WERSSOWETZ DE BYSTRICE, B.A., M.B. (Prague), '38.

The nucleus pulposus of the intervertebral disc is a soft gelatinous mass which is surrounded on its sides by a fibrous ring, the so-called annulus fibrosus; the roof and floor being limited by cartilage, the cartilaginous plates.

The existence of the nucleus pulposus in the intervertebral disc has been known since 1555 when for the first time it was noted by Vesalius. The first accurate description of its structure was given by von Luschka and later by Bardeen. These two workers described the anatomy, embryology, and physiology of the nucleus pulposus, but it was not until Schmorl of Dresden that its pathological aspect was brought into view. Since then numerous investigators tried to correlate the pathological findings with the clinical picture of the nucleus pulposus affections. It is interesting to note that most of the pathological lesions of the nucleus are found accidentally at autopsies, with no history of any clinical symptoms.

EMBRYOLOGY

The origin of the notochord around which the spine is developed is not definitely established, but most likely it starts from a thickening of the entoderm in the mid-sagittal plane known as the chordal plate. Then the notochord is surrounded by mesenchymal cells which migrated from the sclerotomes. These cells, according to Bardeen and Remark, arrange themselves in a segmented column forming provertebrae which are marked off by the entrance of the intersegmental artery, around which the anlage of the body of vertebra is formed in the foetus. The mid-portion of the provertebra which is farthest removed from the intersegmental artery forms the anlage of the intervertebral disc. This development is governed by the amount of nutrition the respective parts receive fram the intersegmental artery. As time goes on there occurs a mucoid degeneration of the notochord and differentiation of the cells of the intervertebral region into an elongated fibroblastic type which are arranged along a vertical axis and are attached above and below to the vertebral bodies. As this fibrous structure becomes more defined it becomes the annulus fibrosus. The remnants of the notochord persisting in the centre constitute the anlage of the nucleus pulposus. It acquires its fibrous elements by invagination of the mesenchymal envelope about it. According to Keyes and Compere the nucleus pulposus is composed of notochord cells until birth, after which they disappear, though remnants may be found even in the adult nucleus pulposus.

ANATOMY

An intervertebral disc may be described as consisting of three parts:

(1) the cartilaginous plates covering the vertebral bodies above and below:

(2) the annulus fibrosus, and

(3) the nucleus pulposus, which never is absent, though its size varies considerably.

The nucleus pulposus which is surrounded by the strong annulus fibrosus, is situated in the centre or more often, at the junction of the middle and posterior thirds. In the thoracic region it is placed more centrally.

On horizontal section the protruding nucleus is rather triangular in outline with the apex directed forward. The nucleus is quite distinctly defined from the annulus fibrosus by a faint crescentic fold.

On sagittal section the nucleus pulposus protrudes outward from the cut surface as a small rounded glistening yellowish or pearly white eminence.

Microscopically the nucleus pulposus is composed of fine interlacing bands of connective tissue with occasional elastic fibres incorporating various types of cells including connective tissue cells, fibroblasts, groups of cartilaginous cells, and some multinuclear cells with clear protoplasm; the latter are thought to be remnants of the chordal cells. A highly fluid matrix is contained in the meshes of this very loose tissue. On the peripheries the fibrous network gradually becomes denser until it merges with the annulus fibrosus.

PHYSIOLOGY

The nucleus pulposus being a semifluid mass with high water content is normally under considerable tension or pressure, and it is subject to the laws of fluids. Therefore, it can be considered incompressible, its normal shape and turgor depending on the integrity of the strong and elastic annulus fibrosus and its water content. This water content gradually decreases with advancing age. Its shape and position can be but slightly altered.

The nucleus pulposus acts:

i. as a spring to keep the vertebrae apart.

ii. as a shock-absorber, by transforming and modifying the force of strain, thus forming a delicate buffer between the vertebrae.

iii. as a fulcrum for movements of the bodies of vertebrae upon each other.

iv. as a protecting agent of the tissues of the disc against infection (J. Calve and M. Galland.)

PATHOLOGY

The pathology of the nucleus pulposus was first studied by Schmorl, who drew attention to the various lesions occurring in this situation.

The only condition which is confined to the nucleus per se is its calcification. All other affections are secondary to changes occurring in the structures surrounding it.

Calcification of Nucleus Pulposus

Calcification of nucleus pulposus was first reported by Calve and Galland in 1922. This condition is rare. The nucleus can be seen in roentgenograms as a shadow in the centre of one or more intervetrebral spaces. It most often occurs in the thoracic and lumbar regions of the spine of elderly individuals.

Macroscopically the nucleus is chalky white in colour and of soft consistency. Microscopically the calcification may consist of fine grains or of larger blocks friable in character. The cells of the nucleus are necrosed, and fibrous tissue is substituted by calcareous deposits.

This condition known as "calcinosis intervertebralis" may give severe pain in the back radiating to the legs, thus simulating Pott's disease from which it must be differentiated. It is a degenerative process accompanied by marked dehydration of the matrix of the nucleus.

The secondary affections of the nucleus are various.

Congenital Anomalies

They are usually confined to herniation of the nuclear matrix through some fissure in the annulus fibrosus or the cartilaginous plates as a result of

congenital defects. Usually the cartilaginous plate shows small fissures through which the nuclear substance is squeezed into the vertebral bodies. This most commonly occurs at about the site from which the notochord was extruded. According to Keyes and Compere such defects with early prolapses may be suggested as an additional etiological factor in the production of the so-called epiphysitis dorsalis juvenilis.

Trauma

(1) Acute trauma to the disc involving the nucleus pulposus, as in fracture-dislocations of vertebrae is followed, according to Geist, by spondylitis. It is interesting to note that in cases where the nucleus pulposus was not injured there was no secondary spondylitis. The disc is mostly injured in fractures of the cervical spine, the nucleus pulposus prolapses, and, as it was noted by Virchov in 1857, may produce a cartilaginous tumour upon the inner surface of the base of the skull, which he named "ecchondrosis physalifora."

(11) Chronic trauma causing injury to the cartilage plate is the predisposing factor in most of the herniations of the nucleus pulposus which become cartilaginous. These nodules are found in men who have been engaged in hard labour and in athletes.

Infection

The role of infectious diseases on the intervertebral disc was studied extensively by Schmorl. He found in cases of typhoid fever, on roentgenic examinations, diminished transparency and thickness of the disc which later became completely obliterated.

Acute pyogenic infection of the spine, as osteomyelitis, will mechanically affect the nucleus by destroying the bounding cartilaginous plate causing herniation.

In tuberculosis of the spine the cartilage plate of the diseased vertebrae is affected. Through such weak places the nucleus herniates and is extruded into the diseased body. Narrowing of the intervertebral space results, which may be the first signs of the disease.

Degeneration

(1) Senile change.

Fibrillation of the cartilage plates, primarily described by Schmorl, and since repeatedly demonstrated by many workers, occurs frequently, and is as suggested by Lyon, a primary affection in successive changes of the senile degenerative process. Fibrillation, in this area, is similar to that in the cartilage of the knee or hip, and is probably merely a result of wear and tear. Through the splits in the cartilage the nucleus prolapses and, combined with senile dehydration of the matrix, it greatly lessens the resiliency and efficiency of the intravertebral disc, which becomes narrow. This results in an increased stress and strain on the bodies of the vertebrae and is followed by sclerosis, lipping and spur formation. Pain and stiffness of the back produced by these changes, and often attributed to rheumatoid affections of the muscles, bones or joints of the spine, is partly or solely due to disorders in the discs. Also deformity as scoliosis is often due to alterations in the shape and elasticity of the disc, which is caused by changes in the nucleus pulposus. Keyes and Compere suggest this mechanism of the prolapse of nucleus pulposus as an etiological factor in osteo-arthritis of the spine.

(II) Primary changes in the vertebrae, as in osteoporosis, osteomalacia or generalized osteitis cystica:

The bone of the body of the vertebra is weakened. The nucleus pulposus, being under constant tension, expands and ballooning of the disc occurs, followed by a secondary sclerosis of the bone underlying the prolapsed cartilage. Occasionally there may be a direct prolapse of the nucleus pulposus into the spongiosa of the vertebrae as a result of bursting of the stretched cartilaginous plate.

Neoplasms

Benin or malignant neoplasms may invade the vertebrae and so weaken them that the nucleus pulposus will prolapse into the softened bone. The malignant tumours may be primary or se-

condary and include endotheliomata, myelomata, sarcomata and carcinomata.

Herniation of Nucleus Pulposus

In all these secondary affections the lesion is confined to the prolapse of the nucleic substance, which being constantly under pressure herniates through minute fissures produced by abnormal conditions of the hyaline cartilaginous plate or the annulus fibrosus.

1. Herniation through the cartilaginous plates.—On examination a break in the cartilaginous plate is always noticeable at the point of penetration of the nuclear material when it forces its way into the spongiosa of the vertebrae. This invading substance then undergoes proliferation and organization. The surrounding bony tissue becomes rarified. The nuclear substance finally forms a firm nodule of cartilage. Later a reaction of the body of the vertebra produces a wall of dense bone about the lesion, making it visible on X-Ray examination.

2. Herniation through the annulus fibrosus.—A hernia through the annulus fibrosus is usually situated on the posterior aspect. The nuclear material escapes along this line of less resistance, enters the spinal canal and forms a swelling under the posterior longitudinal ligament. In a nodule thus produced marked changes occur. Usually the scattered cartilage cells present in the matrix, proliferate, and the whole nodule soon assumes a cartilaginous character. It is usually attached to the disc of the respective vertebra, but occasionally travels under the posterior longitudinal ligament to appear two or three segments away from its origin. The prolapse may be multiple or isolated:—may occur anteriorly, laterally or posteriorly.

Herniation of nucleus pulposus is of very frequent occurrence. Schmorl found it in about 38% of autopsy cases in his series of 3,000 spines. It is more common in men (39.9%) than in women (34.4%). It is apt to occur more easily in those involved in sports or hard work. It is responsible for many cases of kyphosis, especially in adolescents, may cause lordosis or scoliosis.

Though a great variety of pathological lesions of the nucleus pulposus are to be found at autopsies, only few give symptoms during life and only further clinical investigation may show their clinical significance.

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ANIMAL PARASITOLOGY

By M. O. SACKS, '42.

A parasite is a living organism, either animal or plant, which lives on or in some other organism from which it derives its nourishment for the whole or part of its existence. In this paper only animal parasites are to be considered.

Types of Parasitism.

Various types of association exist between parasite and host. The two members of the association may be approximately equally and mutually benefited. This is called mutualism. When the two associates are indispensable to one another it is called symbiosis. With commensalism, one member may secure an advantage without the other undergoing any disadvantage. Another case is where one member lives at the expense of another without causing any injury to it.

One member may injure the body of another, but not enough to produce clinical symptoms, unless present in large numbers. An example of this is the hookworm, which is present in the intestines of man. The last case is that in which one member of the association may give rise to a diseased condition in the other. This disease may be mild and a contributory cause of death, or may be severe, and the direct cause of death. An example of this is the endamoeba hystolitica in man. This parasite destroys the internal tissue, and usually there are no symptoms, since the tissues are built up as fast as they are destroyed, so reaching a state of equilibrium. If the tissues are not built up, however, symptoms appear and the case becomes serious.

Various types of parasites and hosts have been recognized by biologists. Some of these, along with certain definitions, are given in the following list:

A *host* is an organism harboring a parasite. There are several types of hosts.

A *definitive host* is a host which harbours the adult stage of the parasite.

An *intermediate host* is the host harbouring the larval stage of the parasite.

There may be several intermediate hosts at different stages in the larval cycle.

Infection is the establishment of parasites within a host.

Infestation is a term used where parasites do not multiply with the host.

There are also several types of parasites:

External parasite is a parasite on the outside of the body, on the skin, hair or feathers.

An *endoparasite* is a parasite living within the body, in any of the body cavities, or tissues, or organs.

An *erratic parasite* is a parasite that wanders into an organ in which it does not usually live.

A *facultative parasite* is an organism capable of living either free or as a parasite.

An *incidental parasite* is one that establishes itself in a host in which it does not usually live.

An *obligatory parasite* is one which depends for existence on its host.

A *periodic parasite* is a parasite which makes short visits to its host to obtain nourishment or other benefits. An example of this is the mosquito, which comes to its host to obtain a meal.

A *permanent parasite* is one which remains parasitic throughout its life cycle.

A *temporary parasite* is one that is free-living during part of its life cycle. An example of this is the hookworm, which is only parasitic as an adult.

A *pathogenic parasite* is an organism which may bring about harmful modifications which can be demonstrated in the living or dead host, but which are

not necessarily accompanied by symptoms.

Structure of Parasites.

Parasites are often very highly modified in structure to meet the demands of their particular environment. As a group, parasites have little need for sense organs and seldom have them as highly developed as do related free-living animals. Fixed parasites do not have well developed organs of locomotion, if they have any at all. This may be since they are transported from place to place by the host.

Intestinal parasites do not need highly organized digestive tracts, and the tapeworms and sping-headed worms have completely lost this portion of their anatomy. On the other hand, parasites must be specialized, often to a very high degree, to adhere to, or to make their way about in their particular host, or the particular part of their host in which they find conditions suitable for existence. Examples of the specializations of external parasites are the compressed bodies of fleas, permitting them to glide readily between the hairs of their hosts: the backward projecting spines of fleas, which are of much assistance in forcing a path through dense hair by preventing any backsliding; the clasping talons on the claws of lice; the barbed probosces of ticks; and the tactile hairs of mites. In these same parasites can be observed marked degenerations in the loss of eyes and other sense organs, absence of wings, and in some cases reduction of legs.

Internal parasites are even more peculiar combinations of degeneration and specialization. They possess all sorts of hooks, barbs, suckers, and boring apparatus, yet they have no sense organs or special organs of locomotion, a very simple nervous system, and sometimes, as said before, a complete absence of the digestive tube.

The reproductive organs of parasites are usually larger and more complicated than those of free-living relatives, and the number of eggs produced by parasites is, in general, many times as great as that of nearby related, free-living species. This must necessarily be so, because the chances of an egg of a parasite producing an offspring which will succeed in establishing itself within another host are very slender.

The structural or physiological modifications of parasites may be characteristic of groups, genera, or species.

Effects on Host.

The effects of parasites on hosts are almost as numerous and varied as are the kinds of parasites. In general, it may be said that a parasite injures its host in one of three ways. It may rob the host of food which has not yet been assimilated and utilized; it may mechanically injure the tissues or organs of the host; or it may form excretions or toxins, which act as poisons.

The first method of damage is of least importance, though it is obvious that the amount of food abstracted by some parasite, e.g., large tapeworms which may reach a length of several yards and grow at the rate of several feet per month, must be considerable.

Much more serious are the various kinds of mechanical injury to tissues or organs. This damage is done by the blood-sucking parasites, such as hookworms, flukes, leeches and the blood-sucking arthropods, and the tissue-devouring forms such as dysenteric amoebae, malaria parasites, lung flukes, and fly maggots, which may not only devour the cells of the body, but may also cause hemorrhages, give portals of entry for another infection, and perforate the intestine. Here also belong the obstructing parasites which by their presence block blood vessels, as do malaria parasites, or blood flukes; stop up lymph vessels, as do adult filarial worms; or partially or completely close up such ducts as the bile duct and pancreatic duct, as do liver flukes. There are also parasites which damage and inflame the tissues by boring through them, as does Trichinella,

the guinea worm, itch mites, and fly maggots.

The third type of injury, by excretion of toxic substances, is done to some extent by almost all parasites. In external parasites the damage is usually done by an excretion, usually from the salivary glands which prevents the coagulation of blood, and tends to inflame the tissues with which it comes in contact. In the case of internal parasites the toxic substances are probably in most cases the waste products of the parasites, voided into or absorbed by the blood or by neighbouring tissues. In many cases these toxins have specific actions on particular tissues or organs, so that parasites in one part of the body may damage an entirely different part. Intestinal worms, for instance, may produce considerably greater derangements of the blood or of the nervous system than of the intestines; the trypanosome of Chagas' disease produces, by means of toxins, specific effects on the thyroid gland, and gives rise to the symptoms which result from interference with the gland, even though the parasite may not be located in the gland itself.

Infection and Transmission

The portals of entry and means of transmission of parasites is a question of the most vital importance from the standpoint of preventive medicine. With very few exceptions animal parasites do not exist in air and dust as do many vegetable parasites, although some spirochaetes may be blown about with dust and thus infect, in the manner of many bacteria.

The methods of infection and transmission may be summed up as follows:

Transmission by contamination. This is due to lack of sanitary precautions on the part of the host.

Transmission by contagion. Direct transference from one host to another. For example, parasites living in the human mouth may be transferred by kissing.

Inoculation through the agency of an intermediate host, e.g., mosquitoes, carriers of malaria organisms.

The *hereditary method* of transmission is not known to man, but species parasitizing lower types of animals make their way into the eggs of these animals, and so parasitize new generations developing from these eggs.

Prenatal transmission occurs frequently, especially in the case of parasitic worms, and certain of the latter may actively penetrate the skin of the host or enter the definitive host when insufficiently cooked meat from the parasitized intermediate host is eaten.

The interesting point about the transmission of the parasite is that in most cases the parasite is passive during its transfer from one host to another, and transmission is almost entirely due to the activity of the host or of intermediate hosts. Simple sanitary measures are usually all that is necessary to protect human hosts from infection with such organisms as intestinal protozoa and worms, and the parasites of malaria and filariasis.

Geographic Distribution.

Geographical distribution of parasites has much to do with the spread of disease. Parasites, like other organisms, are dependent on certain physical conditions of their environment in order to survive. One of the most important limitations on the dispersion of a parasitic disease is the distribution of certain hosts. Some parasites can apparently live equally well on a large number of hosts, while others can live on one or a few only. A double limitation is placed on parasites which require two hosts to complete their life history; they can only exist in regions in which both hosts exist. In the case of human parasites, the intermediate host is the only limiting factor. For example, the geographic distribution of human sleeping sickness is coincident with the distribution of a certain species of testefly, and the distribution of yellow fever does not extend beyond the range of a certain species of mosquito.

Temperature is an important limiting factor for those parasites which can be directly influenced by it, as external parasites, and those which are free-living for part of their existence. In Mexico, for instance, human lice are entirely absent from hot coastal plains, though abundant on the high central plateau. Hookworms, which are free-living in their young stages, are confined to a broad strip around the tropical and warm temperate sections of the world, and occur outside these limits in short-lived epidemics only, in the warm part of the year.

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MEDICAL ARGOT

MALCOLM H. V. CAMERON, M.D.

It is a platitude to state that a proper use of language is the mark of an educated man. It would be resented if a careless use of language by graduates in medicine of our own or of other Universities in Canada were to be used as an argument that these graduates are poorly educated. They belong to one of the learned professions but many of them fall into the habit of using "cant or class jargon" which is one of the definitions of the word 'argot.'

The answer papers submitted last summer at the examinations of the Medical Council of Canada contained many examples of this jargon. A number of these indicated carelessness. Some were to be excused as the examiner would probably know what was meant by "O.R.," "C.V.A.," "C.S.F.," do a "C.S.P.," do a "rectal," "try a "P.S.P.," do a "cysto," and he would know that the candidate was in a hurry. Eagerness to write it all in the allotted time may also have explained frequent allusions to "staphs" and "streps." A large number of the writers suggested "hospitalizing" their patients and one thought that "Michols" operation was indicated in a given condition.

The abbreviation "etc." has become respectable but "c" has a meaning only in a Latin prescription directed to a pharmacist. It and "cum" were used freely when the word "with" would have been proper. The atrocity "cout" appeared three times! Confusion also existed in the distinction between "excision" and "incision." A few patients would have been given "a quarter of morph." had the candidate's suggestion been adopted.

One anachronism is almost in general use in every medical faculty in Canada. This is "morphia" which every student knows should be spelled "morphine." Some forty years ago all alkaloids were designated by Latin names ending in—ia. In a few cases such as strychnine, codeine and morphine, the old ending persisted among the careless or unlearned. No one things of saying "hyoscinia." To write "morphia" is to leave the impression that the writer was trained in the last century or has been most inattentive when studying Pharmacology.

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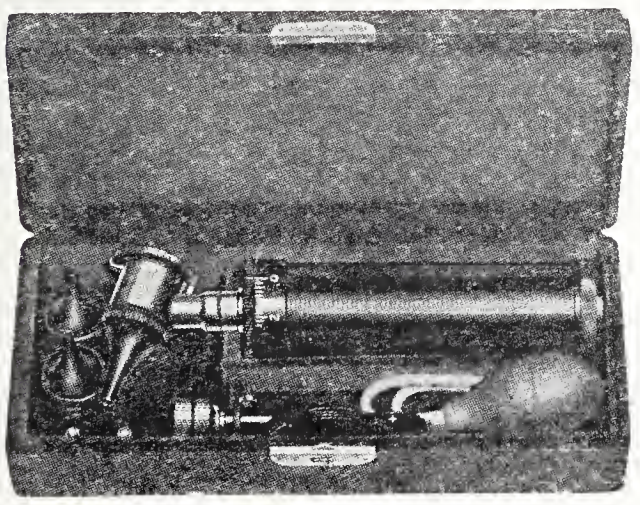

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Medical Society Notes

By W. K. KERR

At the time of writing, the Med At-Home is still one week off; but it may be of interest even after the dance to know something of what goes on behind the scenes of this famous show. The Med. At-Home Committee is composed of the president of the Medical Society, all the year representatives, and the vice-president, Cam Gray, who is chairman of the committee. The great problem is how to obtain an orchestra good enough to satisfy the extravagant tastes of medical students and still have the dance pay for itself. This problem is becoming greater and greater each year, simply because the standards of the dance have been raised each year. It came as a great surprise, a pleasant one at that, to hear that Cam had succeeded in obtaining Duke Ellington's orchestra only a few weeks before the dance.

Many will recall the incident of two years ago, when the orchestra contracted for decided not to turn up two days before the dance—an unpleasant surprise indeed. It may be of interest to know that it is impossible to get a contract with any American orchestra which definitely binds the orchestra to play for the night in question. Perhaps not all know that the afternoon before the dance last year a long distance call from Hamilton informed an already nervous committee that the chartered bus with the band had been arrested for speeding. The driver told the magistrate that he was too preoccupied admiring the Canadian scenery to notice how fast he was driving.

Any chairman of the Med. At-Home Committee must be prepared for unpredictable surprises and when a Med. At-Home dance does become the social event of the year on the campus, it means that ingenious planning and vigilant management has been exercised by the vice-president.

Medical Athletics

By W. B. CHARLES

By the time that these articles are read a month has elapsed from the time of writing. Therefore what we have to say may be somewhat out of date and in addition it is obvious that this space cannot be used for notification purposes. It is very important, then, that the athletic notice boards be consulted at frequent intervals. We have noticed several sports notices pinned up in other places than the athletic boards. If the latter are to serve their purpose adequately they must be used routinely. The boards are of limited size and it will facilitate matters if the one who posts the notice will remove same, once it has served its purpose.

The success of interfaculty teams ultimately rests with the managers. We feel that our faculty is particularly fortunate in the type of men who volunteer for these positions. They are sincerely interested in sport and we appreciate very much their energy and cooperation. There is one matter to which we wish to direct their particular attention and that is the question of health cards. It is very important both for the sake of the health of the participants and for the protection of the officials at Hart House that the managers should place the health card numbers in the hands of the athletic office and verify the eligibility of each player. This has been neglected on two

occasions so far this year with the result that the games have been forfeited. Will the managers please check carefully on this matter.

In the last issue of the journal we spoke of the possible revival of some interyear competition. It is feared that this will not be possible this year owing to the fact that no convenient time is available at Hart House. We recommend that next year's executive consider this matter a little earlier in the season.

Our senior volleyball team after winning the championship two years in a row lost out in the finals this year. This team is composed of some of the best volleyball players in the University and several of them were on the Varsity team when it played in the City league. The boys claim that the lay-off in the Christmas holidays had something to do with it, the other teams having continued practising. However, they gave an excellent account of themselves losing only by the narrowest margin.

The baseball, hockey, water-polo and basket-ball teams are in the midst of their schedules now. The senior basket-ball team made such a fine impression in the first game that the Varsity immediately picked it to win the championship. We wish them the best of success.

The hockey teams have each won and lost a game. These boys deserve a great deal of credit for the first game usually means the first time on ice and consequently they are somewhat short of wind and limb at times. In addition these games are usually very strenuous and hard fought, feeling often running very high.

Entrants in the squash tournament are requested to play their matches as soon as possible.

Abstracts

PENTOTHAL SODIUM IN INTRAVENOUS ANAESTHESIA

By F. Barnett Mallinson, M.R.C.S. Eng. *Lancet. Nov.* 6, 1937.

This article reports the author's experience from 200 administrations of Pentothal Sodium as an intravenous general anaesthetic.

Pentothal Sodium is one of the light group of barbiturates. It is made up in ampoules of 0.5 and 1 gm. and is made up to a 5 or 10 percent solution with water.

It is considerably more powerful than Evipan, Nembutal or Amytal, being the most powerful of the barbituric acid series. Induction is smooth and rapid, the patient showing his lapse into unconsciousness with nothing more than a slight flutter of the eyelids or only a slightly noticeable loss of expression. Sleep thus gently induced is not succeeded by proper muscular relaxation for a further 30 - 40 seconds.

Clinically—The pupils dilate at first. There is light fall in blood pressure with regular slightly elevated pulse rate. Slight cyanosis may appear if the anaesthetic is quite deep. Respiration is very quiet, sometimes imperceptible. Relaxation is excellent without twitching or spasms. By proper technique, given in repeated small doses, it presents practically minute to minute controllability, because it is rapidly detoxicated within the body. The cardinal signs of overdose are (1) deep cyanosis with (2) imperceptible respiration often with complete cessation of breathing. This is readily combatted by Carbon dioxide and Oxygen with intravenous Coramine.

Contraindications—include Respiratory obstruction, dyspnoea, liver disease, acute or chronic nephritis, severe toxaemia, general debility, and childhood.

Comparing it with other barbiturates used for intravenous anaesthesia, the author states that it is much superior to any other, being more rapid, more powerful yet more readily controlled, giving a smoother induction and freedom from post-operative anaesthetic ill-effects. Relaxation with pentothal is much greater, less being used to produce any desired depth or length of anaesthesia. The only reported disadvantages are (1) possible sloughing of skin if any be injected subcutaneously and (2) a tendency to throm-

bosis at site of injection. In experienced hands it is said to be as safe as Evipan and a great deal safer than Chloroform.

A case is reported in which the total amount given was 2.27 gm. over a period of anaesthesia of 3½ hours with no ill effects. The dosage varies with the depth and length of anaesthesia desired.

It is concluded that pentothal represents one of the most valuable advances in the science of anaesthesia that has been made in recent times. J.D.D.

THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS

By Geoffrey Marshall, M.D., f.r.c.p., *British Medical Journal, Dec.* 4, 1937, *p.* 1103.

This is one of the most important and, at once, troublesome problems in medicine and one in which dogmatism has no place. Yet one feels justified in saying that physical examination alone is a broken reed even in the most expert hands in so far as the early diagnosis of pulmonary tuberculosis is concerned, though a complete clinical examination, including physical examination with a careful inquiry into family, contact, and personal history and a painstaking elicitation of symptoms should bring a much better catch into the net.

Early Symptoms.—These are mainly due to toxaemia and thus often not specific. They include fatigue, loss of morning appetite, loss of weight and psychological disturbances often described as neurasthenia or a nervous breakdown. In young women another common toxaemic symptom is amenorrhea.

More specific symptoms are cough, expectoration, night sweats, and haemoptysis. Any one of these symptoms in a young adult is suspicious and several, almost clinches a diagnosis.

One symptom, in the absence of all others is diagnostic, and that is a free haemoptysis "out of the blue." This means a haemoptysis of a cupful or so of bright red blood in an otherwise apparently healthy young person. There is no other cause in such circumstances. Put this patient to bed for two months and announce the diagnosis. This symptom may be so early that *no other findings are obtainable*, and you must not lose control of the treatment.

Early Complications. — Occasionally these make a diagnosis possible. Such is a sterile pleural effusion, diagnostic in the absence of malignant disease. A second complication, almost diagnostic, yet ill recognized is perianal fistula.

Investigations.—Further investigations of primary importance are:

(1) Sputum examination. If no sputum is available use pot. iodide, 10 gr. doses till expectoration is provoked. This includes direct smear and stain, guinea pig inoculation (6 weeks) and growth on Lowenstein's medium (14 days.)

(2) X-ray. This depends on the skill of the one who reads the plates.

(3) Diurnal record of temperature. Morning readings often unusually low and evening readings above 98.4. It must be remembered that at menses, young women often show a slight fever. J.A.G.R.

Also recommended to medical students is **Visceral Pain** by John Morley, Ch.M., *F.R.C.S. Br. Med. Journal, Dec.* 25, 1937. *p.* 1170.

ON THE MODE OF ACTION OF SULPHANILAMIDE IN EXPERIMENTAL STREPTOCOCCUS EMPYEMA

By Gay, F. P., and Clark, A. R. *J. Exp. Med.* 66: 535 (1937).

The chemotherapeutic activity of sulphanilamide (para - amino - benzene-sulphonamide) and its derivatives in streptococcal and perhaps other infections is well known. However, the precise method by which the substance acts in the animal body has not yet been definitely established. Although highly effective in vivo, it has no bactericidal effect on the streptococcus in vitro (nutrient media). To investigate the possibility of cellular intervention being an aid to the action of the chemotherapeutic agent, controlled experiments on the bodily responses to streptococcal empyema treated by sulphanilamide were undertaken.

It was found that the blood serum of sulphanilamide-treated animals inhibited for some days the growth of the streptococcus in vitro but even repeated doses of such treated serum failed to sterilize the culture. The cocci grown in such treated serum are more elongated, pleomorphic, metachromatic and mucoid than normal, but have lost little if any of their virulence. However, the evolution of an invariably fatal streptococcal empyema in rabbits was prevented when sulphanilamide was given repeatedly and in sufficient doses subcutaneously. Complete sterilization of the inoculated cavity occurred on approximately the second day, and it was apparent that for this complete sterilization there was required the activity of locally derived clasmatocytes (macrophages of the connective tissue). The drug does not in itself stimulate the mobilization of the macrophages, but evidently produces a bacteriostasis sufficiently marked to protect the accumulated leucocytes and to allow the natural defence macrophages to accumulate. F.L.L.

THE EFFECT OF HEXYLRESORCINOL UPON THE ABSORPTON OF INSULIN FROM THE GASTRO-INTESTINAL TRACT OF DOGS

By R. G. Daggs, W. R. Murlin and J. R. Murlin. *Am. Journal Physiology. Vol* 120, *No.* 12.

A brief review of the previous attempts at administration of insulin per os is given. These have followed two general principles (1) proteolytic enzyme protection, in which some other substance was administered to protect the insulin against the action of the gastric and paucreatic ferments; (2) that of absorption facilitatiou by lowering surface tension. The present investigators attempt to combine these two principles through the use of hexylresorcinol.

In about half the experiments, a blood sugar drop of over 20 mgm. per cent. was obtained. The reason for the inconsistency was ascribed to possible variability in the psychological factors inducing increased secretion of adrenalin. Best results were obtained with old solutions of hexylresorcinol. Since this improvement was believed to be due to an oxidative process, it was artificially induced with ferric chloride. Although blood sugar often dropped to a level comparable to that obtained by subcutaneous injections of insulin, this level was not maintained for as long a time. Much of the orally administered insulin was always lost or inactivated.

Experiments in vitro indicate that the action of hexylresorcinol is chiefly in lowering the surface tension.

No toxic effects were noted in these experiments or in any previous accounts of therapeutic administration of hexylresorcinol for other purposes. G.D.T.

THE NEUROLOGICAL AND PSYCHOLOGICAL ASPECTS OF HYPOGLYCAEMIA

By Parfitt, D. N.—*Proc. Roy. Soc. Med.* 31: 137 (1937).

This paper presents an extremely thorough and competent study of the schizophrenic under insulin shock treatment.

Following the insulin administration there is manifested a progressive descending impairment of central nervous function, somewhat resembling an alcoholic intoxication, but with indications of a greater influence on the vegetative centres than alcohol would have. Evidences of diminished cortical activity and disordered cortical control become first apparent, followed by striothalamic, thalamic and autonomic signs. Some patients pass quietly into coma but others show increased motor irritability and dysfunction of the corticospinal pathways. The superficial reflexes become sluggish and the deep reflexes exaggerated. With the arrival of the descending inhibition at the vegetative level there is evident disordered autonomic function. Within three hours coma is complete. The corneal reflexes are absent and the plantar responses extensor. Coma may be quiet and easy or severe sympathetic attacks may occur, with tonic spasms representing decerebrate rigidity. Further deepening of coma ends in loss of all reflexes. Following the administration of sugar there is generally a rapid recovery backwards through the stages described. As a rule there is amnesia for the coma period and an hour or so before.

Apart from schizophrenic reactions, hysterical manifestations are the commonest mental symptoms in the recovery period. Fear and anxiety are often observed. Practically nothing occurs before or after coma that could not be explained as an insulin symptom, or as a symptom that might be expected in a person recovering from coma, or, finally, as the expression of general mental improvement.

The complications include hyperexcitability of the nervous system, with laryngospasm. This condition resembles tetany but is probably of different production. Convulsions frequently occur and may be of two types, at least—one group comparable to idiopathic epilepsy and occurring while the cortex is still irritable, and the other group during coma while cortical function is inhibited. Status epilepticus is a dangerous extension of the epileptic tendency. The most striking instances of mental improvement have occurred following excessively slow recovery, accompanied by violent tonic spasms and respiratory distress. This complication may be associated with too rapid increase in insulin dosage, but is not due to hypoglycaemia, cerebral oedema or alkalosis.

The underlying pathology of insulin coma is uncertain. It is believed that insulin calls forth adrenaline in the early stages of hypoglycaemia, acting through the vegetative centres, but that as the inhibitory effect of insulin descends this mechanism is thrown into disorder and excessive autonomic instability results. As the inhibition of function increases there is a great diminution of autonomic effects. The process may be asphyxial since during hypoglycaemia the brain uses less oxygen and sugar. It has been suggested that the good results of insulin shock therapy are due only to emotional shock and psychic trauma. In any case, insulin affects the vegetative centres and probably stimulates internal secretions. Since the sugar level is believed to be controlled by hypothalamic centres, it is of interest that abnormal sugar curves are found frequently in schizophrenics. F.L.L.

OXYGEN METABOLISM IN SCHIZOPHRENIA

By Hoskins, R. G.—*Arch Neurol. & Psychiat.* 38: 1261 (1937).

It has been pointed out that deficiencies in oxygen assimilation in nonpsychotic subjects may bring about a variety of manifestations, evidence of general loss of integration that are highly suggestive of the symptomatology of schizophrenia. For this reason it is of interest to know whether or not there is defective tissue oxygenation in patients suffering from schizophrenic psychosis. The following results are reviewed from studies made to elucidate this problem.

In general, in schizophrenic patients:

(i) the rate of oxygen consumption (Benedict and Roth) is significantly lower than in normal subjects under the same environmental conditions.
(ii) inhaled carbon dioxide causes less respiratory response than in normal subjects;
(iii) there is a lower range of blood volumes, referred to surface areas, than in normal subjects;
(iv) the circulatory rate is slower by 20 per cent, yet no more oxygen is attracted from the blood, than in normal subjects;
(v) there is an apparent dependence on glutathione as an accessory respiratory mechanism, possibly because of a deficiency in other oxidative mechanisms;
(vi) thyroid calls forth less metabolic response than in normal subjects, and probably the same is true for dinitrophenol and amino-acid.

In conclusion, defective oxygen metabolism appears to be a feature in the schizophrenic psychosis. F.L.L.

TREATMENT OF PUERPERAL FEVER BY SULPHANILAMIDE

By Leonard Colebrook and A. W. Purdie (Queen Charlotte's Hospital, London.) *Lancet, Dec.* 4, 1937.

The authors summarize their results thus:—

(1) 106 cases of puerperal sepsis have been treated by sulphanilamide—usually by mouth alone.
100 cases were infected with haemolytic streptococci (92 belonging to Group A. Lancefield).
3 were infected by anaerobic strep.
3 were infected by staphylococci.
(2) The average stay in hospital has been 19.7 days as compared with 31.3 days in 1935.
(3) There were eight deaths among the 100 cases (of Haemolytic Strep.) but only three of these can be regarded as deaths from straight forward sepsis alone, in patients who lived long enough for chemotherapy to have a fair trial.
(4) The mortality rate for all cases (199) infected by haemolytic strep. since the beginning of 1936 (when chemotherapy was begun) has been 5.5 per cent. as compared with the average of 22.8 per cent. for the preceding five years.
(5) Toxic manifestations included cyanosis in 58 cases (met—and sulphhaemoglobinaemia), drug fever, prostration, paraesthesiae, visual disturbances and joint pains.
(Fifteen more cases have been treated during the preparation of this paper—with no deaths.)

In discussing the significance of this apparently phenomenal reduction in mortality the authors state—

"While we admit that a diminished severity of the infective process may have been in part responsible for the satisfactory results observed, there seems to us very little doubt, that the treatment by sulphanilamide has played an important part. There is, in our view, abundant support for the continued use of sulphanilamide in puerperal infections by haemolytic streptococci, but not for its use in similar infections due to other organisms (apart from B. Coli infections of the urinary tract). In order to avoid the prolonged use of this drug in unsuitable cases with risk of toxic effect we would again urge the importance of a bacteriological examination of a vaginal swab taken as early as possible from every case of puerperal pyrexia. J.D.D.

THE LEAD AND ARSENIC CONTENT OF CANADIAN DOMESTIC TOBACCOS

By F. A. J. Zeidler and W. J. Wagner. *Can. Pub. Health Journal. Vol.* 28. *No.* 12.

Arsenate of lead is used extensively as a spray for the protection of tobacco plants from insect pests. Its usefulness in this respect and its danger to smokers are due to the fact that it tends to adhere to the leaf. In the United States, the arsenic content is 50 times and the lead content 100 times the limit permitted in foods. Since, in the former, they are absorbed directly into the blood via the lungs, they are potentially more harmful than when taken per os.

Lead has been shown to have toxic

effect when regularly ingested over a long period of time. It is only rarely a direct cause of death but it tends to "dampen down" the metabolic processes. It may be collected and stored in the tissues like the Spirochaeta Pallida until released by some metabolic disturbance. Arsenic has been found to be a factor in causing bald spots, abnormal pigmentation, etc. Also, since these drugs are synergists, their combination in tobacco is especially significant.

Lead exerts its toxic effects when there are present 0.15 to 0.6 mgm. lead per cubic metre of air. Experiments performed by the writers showed that the average lead content of the Canadian cigarettes examined was 22 parts per million. The arsenic content was estimated to be almost 11 parts per million. In pure oriental tobaccos, lead was present in less than 2.5 parts per million.

The writers recommended control of the situation either through development of less toxic sprays or the establishment of a safe contamination tolerance.

G.D.T.

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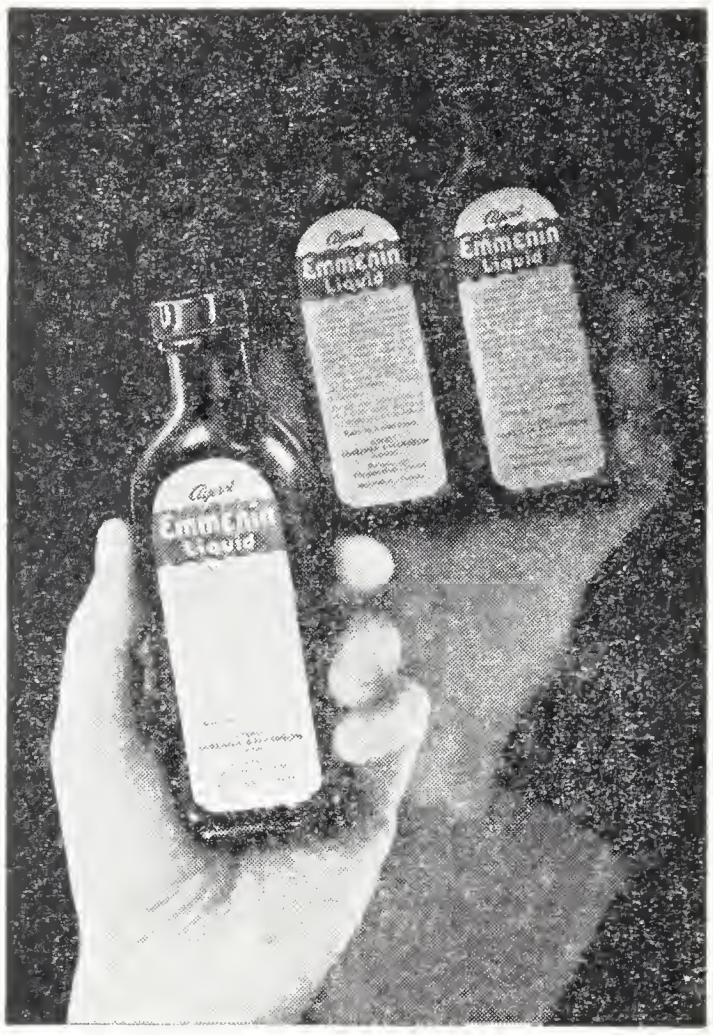

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Clinical investigations have shown that a higher potency of the oestrogenic hormone, Emmenin, would be advantageous. New developments in the manufacturing technique have now made possible the production of Emmenin with a potency of 120 day-oral units (Collip) per teaspoonful or tablet and, of particular importance from the patient's standpoint, with greatly improved palatability. This increase in potency (from 60 to 120 units per teaspoonful of Emmenin Liquid or per tablet) will not affect the cost to the patient.

EMMENIN

for menstrual disturbances

The orally-active oestrogenic placental hormone, prepared and biologically standardized after the technique of Dr. J. B. Collip and supplied with the approval of the Department of Biochemistry, McGill University.

Emmenin Liquid — in original sealed bottles of 4 fluid ounces.
Emmenin Tablets — in bottles of 42.

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Biological and Pharmaceutical Chemists

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